







**TABLE XXVI—continued.**

DETAIL of DISEASES.

EUROPEAN ARMY OF INDIA.												INDIAN ARMY.											
Diseases.	British Officers attached to European Troops.			Men.			Women.		Children.		British Officers attached to Indian Troops.			Men present enrolled.				Total Population of India. 183,375					
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.						
POISONS.																							
Arsenic . . . . .	..	..	..	1	0·02	..	..	..	..	..	..	..	1	1	..	0·19	2	..					
Dolium tremens . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..					
Chloroform and other anæsthetic drugs.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..					
Alcoholism . . . . .	1	..	..	1	0·09	1	..	..	..	..	..	..	..	..	..	1	1	1					
Other chemical poisons .	..	..	..	4	0·16	..	..	..	..	..	..	..	3	..	..	0·08	..	..					
Vaccine and sera . . .	..	..	..	16	0·52	..	..	..	..	..	..	..	8	..	..	0·25	16	1					
Snakes . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..	0·38	4	..					
Insects . . . . .	..	..	..	3	0·10	..	..	..	..	..	..	..	7	..	..	0·13	..	..					
Vegetable poisons . . .	..	..	..	..	..	..	..	..	..	2	..	..	4	1	1	0·20	154	1					
Poisonous food . . . .	..	..	..	33	0·46	..	..	..	..	..	..	..	..	..	..	..	..	..					
All other poisons . . .	1	..	1	1	0·01	..	..	2	..	..	1	..	5	2	..	0·18	8	2					

## TROOPS AND PRISONERS, 1932.

[illegible]

TABLE XXVI—continued.

DETAIL of DISEASES.

EUROPEAN ARMY OF INDIA.													INDIAN ARMY.							
DISEASES OF THE URINARY ORGANS.	British Officers attached to European Troops.			Men.			Women.			Children.			British Officers attached to Indian Troops.			Men present enrolled.			Total Population of India. 165,975	
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.	
Acute nephritis . . .	1	"	"	14	0.94	3	"	2	"	2	1	"	"	14	2	4	1.85	128	10	
Chronic nephritis . .	"	"	"	3	0.91	1	3	3	"	"	"	"	1	5	1	2	0.44	66	19	
Cystitis . . . .	4	"	"	35	2.21	"	"	10	"	2	"	"	"	20	"	"	1.83	38	2	
Calculus of bladder .	"	"	"	4	0.28	"	"	"	"	"	"	"	"	16	"	1	1.45	1	"	
Incontinence of urine	"	"	"	8	0.17	"	"	"	"	"	"	"	"	3	"	"	0.16	"	"	
Hæmaturia . . . .	"	"	"	41	1.62	"	"	1	"	"	"	"	"	7	"	"	0.30	7	"	
Other diseases of the urinary.	10	"	3	121	9.85	2	7	32	"	8	"	13	"	163	2	3	10.30	150	5	
GENERAL INJURIES.																				
Effects of heat due to climate (Heat Exhaust- tion).	7	"	"	178	6.00	6	1	1	"	2	"	3	"	1	15	"	0.29	38	"	
Heat-Stroke . . . .	2	"	"	50	1.56	12	1	"	"	"	"	"	"	"	1	"	0.91	227	51	

Disease	No.	%	Cases	Males	Females	Total
Uter . . . . .	7	0·47	..	..	..	1
Boli . . . . .	485	12·87	..	3	8	11
Caruncle . . . . .	24	0·35	..	..	..	1
Other diseases of the areolar tissue.	16	0·78	3	2	1	4
<b>DISEASES OF THE SKIN.</b>						
Dermatitis . . . . .	120	7·95	2	..	..	..
Urticaria . . . . .	30	0·92	..	2	1	..
Impetigo . . . . .	395	17·69	..	1	12	..
Eczema . . . . .	91	5·53	3	..	5	..
Poriasis . . . . .	26	1·87	..	..	..	..
Sabies . . . . .	61	2·09	..	..	..	..
Favus . . . . .	..	..	..	..	..	..
Pedunculosis . . . . .	2	0·03	..	..	..	..
Wart . . . . .	..	..	..	..	..	..
Tinea . . . . .	287	10·20	..	..	..	..
Aloe . . . . .	9	0·75	..	1	..	..
Prickly heat . . . . .	16	0·47	..	..	1	..
Sycosis . . . . .	7	0·42	..	..	..	..
Oncychia . . . . .	6	0·17	..	..	..	..
Whitlow . . . . .	42	1·60	..	..	..	..
Ingrowing toe nail . . . . .	111	4·95	..	1	1	..
Other diseases of the skin.	144	6·03	1	1	5	..

TABLE XXVI—continued.

### DETAIL of DISEASES

[illegible]



TABLE XXVI—continued.

DETAIL OF DISEASES.

DISEASES.	EUROPEAN ARMY OF INDIA.						INDIAN ARMY.						Jail Population of India. 163,675		
	British Officers attached to European Troops.			Men.		Women.		Children.		British Officers attached to Indian Troops.			Men present enrolled.		
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.
DISEASES OF THE FEMALE ORGANS OF GENERATION.															
Diseases of the ovary	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Diseases of the fallopian tube.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pelvic peritonitis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Endometritis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Displacements and distor- tions of the uterus.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Inflammation of vagina	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
New growths, non-malignant, of uterus.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dysmenorrhoea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Menorrhagia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Metrorrhagia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

DISEASES DUE TO DIS-  
ORDERS OF NUTRI-  
TION OR OF METABOLISM.

Imitation . . . . .	2	"	"	1	0.14	"	2	24	6	"	"	2	"	0.06	"	"
Rickets . . . . .	"	"	"	"	"	"	"	1	"	"	"	"	"	"	"	"
Scurvy . . . . .	"	"	"	"	"	"	"	1	1	"	"	"	"	"	12	"
Beri-beri . . . . .	"	"	"	"	"	"	"	"	"	"	"	"	"	"	49	2
Gout . . . . .	"	"	"	"	"	"	"	"	"	"	"	2	"	0.03	12	"
Diabetes mellitus . . . . .	"	"	1	5	0.78	"	5	2	"	"	"	11	6	1.41	68	5
Other diseases due to dis- orders of nutrition or of metabolism.	"	"	"	2	0.07	"	"	3	"	"	"	5	"	0.17	28	1
DISEASES OF THE MALE ORGANS OF GENERATION.																
Phimosi . . . . .	"	"	"	63	4.06	1	"	18	"	"	"	43	"	2.85	67	"
Paraphimosis . . . . .	"	"	"	25	1.33	"	"	"	1	"	"	1	"	0.07	18	"
Balanitis . . . . .	"	"	"	113	3.33	"	"	1	"	"	"	17	"	0.62	3	"
Urethritis . . . . .	"	"	"	267	15.34	"	"	"	"	"	"	101	"	4.87	22	"
Stricture of the urethra . . . . .	"	"	"	3	0.13	"	"	"	"	"	"	5	"	0.26	30	"
Urethral fistula . . . . .	"	"	"	"	"	"	"	"	"	"	"	"	"	"	3	"
Hypertrophy of the pro- state.	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Hydrocele of tunica vaginalis.	"	"	"	39	1.87	"	"	"	"	"	"	4	"	0.30	135	"
Variocoe . . . . .	"	"	"	50	2.92	1	"	"	"	"	"	18	"	0.98	"	"
Epididymitis . . . . .	"	"	"	110	5.11	"	"	5	"	"	"	25	2	1.32	3	"
Other diseases of the male organs of generation.	1	"	"	"	"	"	"	"	2	"	"	114	"	5.60	342	"



TABLE XXVI.—continued.

DETAIL OF DISEASES.

Diseases.	EUROPEAN ARMY OF INDIA.										INDIAN ARMY.									
	British Officers attached to European Troops.			Men.			Women.		Children.		British Officers attached to Indian Troops.			Men present enrolled.			Jail Population of India, 1897.			
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.			
DISEASES OF THE DIGESTIVE SYSTEM— <i>contd.</i>																				
Hæmorrhoids . . . .	6	..	..	209	845	..	..	4	..	..	..	7	..	1	255	..	..	1333	824	..
Dysentery . . . .	52	..	1	752	1914	..	..	45	..	149	4	26	..	..	773	..	..	1736	3,626	32
Constipation . . . .	2	..	..	360	76	..	..	37	..	58	..	3	..	1	402	..	..	639	638	1
Colic . . . .	5	..	..	177	402	..	..	6	..	3	..	4	..	..	161	..	..	285	789	1
Acute hepatitis . . .	9	..	1	93	726	..	1	..	..	1	..	2	..	..	68	1	3	492	47	1
Abscess of the liver .	3	1	1	16	323	3	4	..	..	1	..	1	1	..	5	..	..	052	43	3
Cirrhosis of the liver .	..	..	..	3	020	..	..	..	..	1	..	..	..	..	4	..	3	000	28	13
Jamblon, obstructive .	62	..	1	476	2457	..	..	3	..	16	..	12	..	..	419	3	..	2378	1,009	9
Cholecystitis including gallstones.	3	..	..	34	216	..	1	5	..	2	..	2	..	..	22	..	..	131	10	2
Other diseases of the digestive system.	14	..	6	316	1643	1	7	32	..	23	2	17	..	..	193	10	1	926	912	46

DISEASES OF THE TEETH AND GUMS.	1	...	...	22	0-28	...	...	4	...	10	...	...	...	...	...	...	40	...	...	0-91	77	1
Caries of the dentine cement and enamel.	1	...	...	...	0-28	...	...	...	...	10	...	...	...	...	...	...	...	...	...	...	...	...
Gum-boil	...	...	...	30	0-35	...	...	...	...	1	...	2	...	...	...	...	131	...	...	3-20	330	...
Pyorrhea alveolaris	...	...	...	8	0-14	...	...	1	...	...	...	...	...	...	...	...	58	...	8	2-36	69	...
Other diseases of the teeth and gums.	6	...	...	72	1-75	...	...	2	...	20	...	4	...	...	...	...	61	...	...	1-42	106	...
DISEASES OF THE DIGESTIVE SYSTEM.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Adenoid Vegetation	...	...	...	...	...	...	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	...
Stomatitis	...	...	...	15	0-36	...	...	1	...	3	...	...	...	...	...	...	28	...	...	0-71	146	...
Tonsillitis	50	...	...	1,864	45-09	...	...	63	...	196	1	41	...	...	...	...	744	...	...	17-23	228	...
Hypertrophy of the tonsils	...	...	...	53	1-57	...	...	3	...	55	...	...	...	...	...	...	4	...	...	0-32	...	...
Inflammation of the palate and pillars of fauces.	...	...	...	1	0-03	...	...	...	...	2	...	...	...	...	...	...	1	...	...	0-01	...	...
Diseases of the pharynx and oesophagus.	14	...	...	423	8-73	...	...	6	...	15	...	14	...	...	...	...	2,187	...	...	42-44	217	1
Gastritis	15	...	...	225	8-67	...	2	28	...	17	...	15	...	...	...	1	103	...	1	3-44	128	3
Indigestion	4	...	...	143	6-33	...	...	25	...	9	...	15	...	...	...	...	409	...	...	11-17	1,085	...
Enterit	9	...	...	16	0-46	...	...	1	...	64	9	...	...	...	...	...	12	...	...	0-23	390	17
Colitis	2	...	...	31	1-10	...	...	1	...	5	...	3	...	...	...	1	21	...	1	1-38	4,140	25
Fistula in ano	...	...	...	12	0-95	...	...	1	...	...	...	1	...	...	...	...	47	...	...	3-70	40	...
Hæmorrhia	2	...	...	110	8-95	1	2	3	...	4	...	3	...	...	...	...	88	...	8	7-56	97	2
Intestinal obstruction	1	...	...	5	0-32	2	...	1	...	1	1	...	...	...	...	...	1	1	...	0-01	14	8
Appendicitis	33	1	2	436	29-67	11	3	30	...	12	...	23	...	...	...	3	160	5	2	9-64	115	4
Sprue	1	...	...	3	0-56	1	...	7	...	...	...	...	...	...	...	...	2	...	...	0-24	20	1

TABLE XXVI—continued.

DETAIL OF DISEASES.

Diseases.	EUROPEAN ARMY OF INDIA.										INDIAN ARMY.										Jail Population of India. 163,375.	
	British Officers attached to European Troops.			Men.			Women.			Children.			British Officers attached to Indian Troops.			Men present enrolled.			Admissions.	Deaths.		
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Constantly sick.				
DISEASES OF THE RESPIRATORY SYSTEM.																						
Asthma . . . . .	1	"	1	23	0.94	...	2	9	"	4	"	1	"	...	64	1	14	3.55	831	21		
Bronchitis . . . . .	22	"	"	609	31.05	8	8	47	"	177	1	21	"	2	1,805	1	9	51.79	3,001	28		
Empyema . . . . .	1	"	"	8	1.44	"	"	"	"	"	"	"	"	"	5	1	"	1.52	5	"		
Laryngitis . . . . .	2	"	"	49	1.19	...	"	2	"	8	"	"	"	"	106	"	"	3.08	32	1		
Pleurisy . . . . .	5	"	"	88	5.81	...	3	8	"	1	"	4	1	...	224	3	18	17.69	254	8		
Pneumonia—																						
(a) Lobar . . . . .	7	1	"	187	16.26	24	2	6	1	13	1	5	2	"	836	84	1	64.07	2,060	428		
(b) Lobular . . . . .	4	"	"	67	5.43	3	2	3	"	82	7	1	1	"	125	13	"	10.89	989	269		
Pulmonary tuberculosis .	3	"	3	68	13.83	3	44	5	1	1	"	"	"	"	251	16	251	24.34	989	269		
Other diseases of the respiratory system.	2	"	"	67	3.39	...	8	1	"	5	1	2	"	2	88	2	3	2.58	454	12		



TABLE XXVI—continued.

## DETAIL OF DISEASES.

EUROPEAN ARMY OF INDIA.										INDIAN ARMY.										
Diseases.	British Officers attached to European Troops.			Men.			Women.			Children.			British Officers attached to Indian Troops.			Men present enrolled.			Jail Population of India. 168,575.	
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.
DISEASES OF THE CIRCULATORY SYSTEM—contd.																				
Diseases of the heart valves.	2	1	1	26	3·67	2	20	10	1	2	..	..	..	..	11	..	11	0·92	182	31
Diseases of blood vessels.	3	..	..	59	8·37	1	5	8	..	..	..	..	..	..	50	8	4	2·75	2	..
Endocarditis . . .	1	1	..	8	0·50	1	2	..	..	..	..	..	..	..	2	1	1	0·05	..	..
Other circulatory diseases.	1	..	2	8	0·63	1	2	3	..	..	..	..	..	..	12	4	5	1·24	160	41
DISEASES OF THE BLOOD.																				
Anæmia primary . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	..	..	0·63	..	..
"  perniciosa . . .	..	..	..	..	..	..	..	1	..	1	1	..	..	..	16	..	3	1·96	605	41
"  secondary . . .	1	..	1	24	1·24	..	..	7	..	2	..	1	..	1	114	1	3	8·52	..	..
Doubtful . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	886	21

Errors of refraction . .	9	0.17	2	1	1	1	17	6	0.89	1	...
Elephantiasis . . .	1	0.05	1	...	...	...	7	...	0.27	4	...
Glaucoma . . .	...	...	...	...	...	...	2	...	0.24	10	...
Iritis . . .	5	0.38	...	...	...	...	15	...	1.28	18	...
Trachoma . . .	8	0.10	...	...	...	...	215	10	11.57	77	...
Other diseases of the eye .	82	1.37	5	2	1	2	105	22	8.42	431	...
DISEASES OF THE EAR.											
Inflammation of external ear.	1	3.87	...	2	...	4	74	...	2.14	133	...
Diseases of the middle ear	1	12.18	15	...	...	3	304	1	15.01	98	...
Diseases of the mastoid process.	...	0.49	...	...	...	...	9	1	1.12	41	...
Other diseases of the ear .	5	3.76	4	2	...	1	35	1	1.32	84	...
DISEASES OF THE NOSE.											
Diseases of the mucous membrane.	10	5.17	...	5	...	16	884	...	16.15	128	...
Diseases of the bone and cartilage.	2	2.42	...	2	...	3	1	...	0.01	...	...
Other diseases of the nose .	9	1.81	1	4	...	...	19	1	1.18	98	...
DISEASES OF THE CIRCULATORY SYSTEM.											
Disordered action of the heart.	3	7.80	2	6	...	5	26	4	2.01	4	1

# TABLE XXVI *contd.*

DETAILS OF S.E. ES.

EUROPEAN ARMY OF INDIA.										INDIAN ARMY.										Jail Population of India. 168,575.	
Diseases.	British Officers attached to European Troops.			Men.			Women.			Children.		British Officers attached to Indian Troops.			Men present enrolled.				Admissions.	Deaths.	
	Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.				
MENTAL DISEASES.																					
Feeble-mindedness . . .	..	..	..	11	2-80	..	8	..	..	..	..	..	..	..	..	3	..	1	0-66	3	..
Dementia praecox . . .	..	..	..	17	8-75	..	12	..	..	..	..	..	..	..	..	3	1	2	0-27	25	4
Mania . . .	..	..	..	8	2-22	..	6	..	..	..	..	..	..	..	..	6	..	5	0-56	39	1
Melancholia . . .	..	..	..	11	2-55	..	9	..	..	..	..	..	..	..	..	5	..	5	0-49	27	..
Delusional insanity . . .	..	..	..	4	0-87	..	4	1	..	..	..	..	..	..	..	5	..	5	0-72	1	..
Other mental diseases . . .	..	..	..	14	2-13	..	10	..	..	..	..	..	..	1	..	4	..	3	0-36	24	1
DISEASES OF THE EYE.																					
Cataract . . .	..	..	..	3	0-26	..	..	..	..	..	..	..	..	..	..	12	..	3	0-95	19	..
Conjunctivitis . . .	4	..	..	68	2-48	..	..	4	..	..	..	..	..	..	..	744	..	1	23-71	869	1
Keratitis . . .	..	..	..	85	2-78	..	1	1	..	..	..	..	..	..	..	189	..	8	11-69	13	..
Amblyopia . . .	..	..	..	3	0-16	..	..	..	..	..	..	..	..	..	..	2	..	2	0-53	..	..





TABLE XXVI—continued.

### DETAIL of DISEASES.

EUROPEAN ARMY OF INDIA.										INDIAN ARMY.							
British Officers attached to European Troops.			Men.			Women.		Children.		British Officers attached to Indian Troops.			Men present enrolled.			Total Population of India. 165,575.	
Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.	
Dysentery . . . . .	3	1	2	0.13	1	..	..	..	..	..	1	1	..	0.17	6	4	
Pyrexia of malarial origin	..	..	106	7.39	..	..	..	..	..	..	21	1	..	2.21	2,151	8	
Rabies . . . . .	..	..	..	..	..	..	..	..	..	..	1	1	..	0.02	7	3	
Delusory fever . . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	1.45	1	..	
Rheumatic fever . . . . .	3	2	79	6.56	1	4	7	..	..	..	64	..	2	5.38	504	6	
Enteritis . . . . .	..	..	4	0.14	..	..	..	..	..	..	..	..	..	0.06	..	..	
Sandy fever . . . . .	63	..	2,202	47.67	..	..	10	..	..	..	1	1,880	..	34.56	269	2	
Scarlet fever . . . . .	1	..	4	0.36	..	..	2	..	..	..	..	1	..	0.01	..	..	
Septicæmia . . . . .	3	..	6	0.31	3	..	2	..	..	..	..	7	..	0.54	9	7	
Small-pox . . . . .	2	..	4	0.23	..	..	1	..	..	..	..	22	3	2.26	86	5	
Tuberculosis . . . . .	..	..	2	0.23	..	..	..	..	..	..	2	..	1	0.32	4	2	



TABLE XXVI.

### DETAIL OF DISEASES.

EUROPEAN ARMY OF INDIA.										INDIAN ARMY.										
DISEASES CAUSED BY INFECTION.			British Officers attached to European Troops 2,265.			Men 55,836.			Women 4,817.		Children 6,684.		British Officers attached to Indian Troops 2,178.			Men present enrolled 121,018.			Total Population of India. 168,375.	
Admissions.	Deaths.	Invalids.	Admissions.	Constantly sick.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Admissions.	Deaths.	Invalids.	Constantly sick.	Admissions.	Deaths.		
Amiara . . . . .	"	"	"	"	"	"	"	"	"	"	"	"	1	"	"	0.05	"	"		
Blackwater fever . . . . .	"	"	"	"	"	"	"	"	"	"	"	"	5	2	"	0.21	1	"		
Chicken-pox . . . . .	5	"	1	0.08	"	1	"	"	"	20	"	"	170	"	"	10.85	652	"		
Cholera . . . . .	"	"	"	"	"	"	"	"	"	"	"	"	4	2	"	0.22	26	7		
Cow-pox . . . . .	"	"	7	0.26	"	"	"	"	"	"	"	"	3	"	"	0.08	"	"		
Dengue . . . . .	"	"	482	10.88	"	14	"	"	"	12	"	"	141	"	"	8.01	245	"		
Diphtheria . . . . .	5	"	78	7.22	"	11	"	"	"	57	3	"	8	"	"	0.55	2	1		
Dysentery—																				
(a) Protozoal . . . . .	16	"	1	215	16.27	2	4	"	5	"	"	1	251	"	"	14.77	"	"		
(b) Bacillary . . . . .	23	"	1	605	24.85	2	16	"	56	2	10	"	827	2	2	31.64	"	"		
(c) Chemical . . . . .	12	"	"	304	14.69	3	5	"	32	3	"	"	308	1	"	14.39	"	"		
(d) Bacillary Exudate . . . . .	14	"	"	386	15.04	1	8	"	44	3	5	"	544	"	"	20.65	"	"		
Dysenteric diarrhoea . . . . .	"	"	"	"	"	2	"	"	"	"	1	"	1	"	"	0.10	"	"		

### **III.—TROOPS AND PRISONERS, 1932.**



## XXV.

## INDIAN OTHER RANKS.

*contrasted with the previous year and the average for the previous five years.*

Dysentery.		Pyrexia of uncertain origin.		Pneumonia, Lobar and Lobular.		Venereal Diseases.		Dengue.		Sandfly fever.		Plague.	
Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
13.5	0.05	0.1	0.01	...	...	8.2	0.00	0.0	...	24.2	...	...	...
14.9	0.03	0.2	0.02	10.4	1.32	8.0	...	...	...	27.4	...	...	...
13.6	...	0.1	0.02	9.3	1.04	7.4	0.02	0.1	...	27.4	...	...	...
22.5	0.06	0.2	...	...	...	7.0	0.02	...	...	8.7	...	...	...
22.1	0.07	0.4	...	7.0	0.79	6.8	0.07	...	...	19.6	...	...	...
31.1	0.07	0.1	...	8.5	0.92	5.0	...	0.4	...	8.9	...	...	...
12.6	0.07	0.1	0.01	...	...	16.6	0.01	2.0	...	2.9	...	...	0.01
16.5	...	0.2	...	8.3	0.91	11.2	...	0.5	...	2.6	...	...	...
15.8	0.08	0.1	...	7.0	0.51	15.9	...	0.5	...	3.8	...	...	...
16.4	0.07	0.5	0.02	...	...	18.6	...	3.2	...	1.0	...	0.1	0.03
18.8	0.05	1.0	...	5.8	0.62	14.6	...	5.8	...	2.8	...	...	...
17.0	...	0.4	...	5.4	0.48	12.5	...	1.1	...	2.4	...	0.2	0.24
10.0	0.10	...	...	...	...	44.9	0.20	32.1	...	0.5	...	0.1	...
14.4	...	...	...	8.0	1.46	41.3	...	16.6	...	2.0	...	...	...
14.8	...	...	...	5.5	0.44	39.3	...	21.6	...	...	...	0.2	...
14.9	0.06	0.3	0.01	9.1	1.25	13.1	0.01	2.4	...	13.0	...	0.0	0.01
16.7	0.03	0.3	0.01	8.7	1.06	11.0	0.01	1.8	...	16.3	...	...	...
16.7	0.02	0.2	0.01	7.9	0.80	10.9	0.01	1.2	...	15.3	...	0.0	0.04

TABLE

INDIAN OFFICERS AND

Table showing Admission and Death Ratios per 1,000 of strength by Commands

Commands and years.		Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Northern mand.	Com- { 1927-31	2.6	0.21	6.6	0.04	0.1	0.03	0.2	0.00	174.1	0.12
	1931	2.3	0.26	6.0	...	0.0	...	0.2	0.02	172.9	0.09
	1932	2.2	0.16	12.3	0.02	0.0	...	0.2	0.03	164.4	0.17
Western mand.	Com- { 1927-31	2.4	0.13	2.4	0.04	...	...	0.2	...	125.1	0.13
	1931	3.5	0.20	0.1	...	...	...	...	...	171.4	0.07
	1932	2.9	0.21	15.1	...	0.1	...	0.2	...	175.1	...
Eastern mand.	Com- { 1927-31	2.3	0.22	6.8	0.01	0.2	0.06	0.3	0.02	87.0	0.15
	1931	2.3	0.37	15.6	...	...	...	0.4	...	129.7	0.16
	1932	2.0	0.13	6.6	...	0.0	0.08	0.1	...	130.0	...
Southern mand.	Com- { 1927-31	1.7	0.11	10.3	0.01	0.1	0.03	0.2	0.01	77.8	0.08
	1931	1.6	...	16.3	...	...	0.05	0.1	...	78.8	0.05
	1932	1.7	0.05	7.4	...	...	...	0.2	0.05	79.1	...
Burma	District { 1927-31	3.3	0.10	26.5	0.44	0.0	...	0.2	...	152.9	0.15
	1931	6.7	0.18	16.2	...	...	...	...	...	196.0	0.36
	1932	0.7	0.22	1.1	...	...	...	0.2	...	183.6	0.44
All India	. { 1927-31	2.3	0.18	7.4	0.04	0.1	0.03	0.2	0.01	132.4	0.10
	1931	2.5	0.23	9.3	...	0.0	0.01	0.2	0.01	149.4	0.10
	1932	2.1	0.14	10.3	0.01	0.0	0.02	0.2	0.02	145.1	0.10

TABLE XXIV—*concl'd.*

Diseases. Average Strength—2,175	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>								
Diseases due to disorders of nutrition or of meta- bolism.	...	...	...	...	...	..	...	...
Diseases of the—								
Generative system .	3	...	...	0·13	1·4	...	...	0·06
Organs of locomotion .	23	...	1	1·10	12·9	...	0·46	0·51
Areolar tissue .	57	...	...	1·94	26·2	...	...	0·89
Skin—								
Scabies . . .	...	...	...	...	...	...	...	...
Other diseases . .	4	...	...	0·07	1·8	...	...	0·03
Urinary system . .	18	...	1	1·00	8·3	...	0·46	0·46
Injuries—								
General . . .	3	...	1	0·13	1·4	...	0·46	0·06
Local . . .	90	4	6	3·93	41·4	1·84	2·76	1·81
In action . . .	...	1	...	...	...	0·46	...	...
Tumours and cysts .	1	...	...	0·04	0·5	...	...	0·02
Malformations . .	...	...	...	...	...	...	...	...
Poisons . . .	1	...	...	0·02	0·5	...	...	0·01
Parasites—								
Animal . . .	6	...	...	0·07	2·8	...	...	0·03
Vegetable . . .	...	...	...	...	...	...	...	..
No appreciable disease .	4*	...	...	0·10*	1·8	...	...	0·05
<i>Suicides</i> . . .	...	(2)	...	...	...	(0·92)	...	...
TOTAL .	700	15	26	24·36	321·8	6·90	11·95	11·20

\* Includes 1 admission for Typhoid fever carrier.



TABLE XXIV—*contd.*

Diseases. Average Strength—2,175	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
<i>Circulatory system—</i>								
Valvular diseases of the heart.	...	...	...	...	...	...	...	...
Disordered action of the heart.	5	1	...	0·28	2·3	0·46	...	0·13
Other diseases . .	6	...	1	0·35	2·8	...	0·46	0·30
<i>Diseases of the—</i>								
Blood . . . .	3	...	1	0·06	1·4	...	0·46	0·03
Spleen . . . .	...	...	...	...	...	...	...	...
Lymphatic system .	1	...	1	0·01	0·5	...	0·46	0·00
Endocrine glands	...	...	...	...	...	...	...	...
Breast . . . .	1	...	...	0·00	0·5	...	...	0·00
<i>Respiratory system—</i>								
Larynx and trachea .	1	...	1	0·02	0·5	...	0·46	0·01
Bronchi and bronchioles.	22	...	2	0·50	10·1	...	0·92	0·23
Lung, other than tuberculosis and pneumonia.	1	...	1	0·04	0·5	...	0·46	0·02
Other diseases . .	4	1	...	0·23	1·8	0·46	...	0·11
Teeth and gums . .	6	...	...	0·11	2·8	...	...	0·05
<i>Digestive system—</i>								
Inflammation of Tonsils.	41	...	...	1·43	18·9	...	...	0·66
Liver diseases . .	16	1	...	0·71	7·4	0·46	...	0·33
Other diseases . .	131	...	7	3·97	60·2	...	3·22	1·83

TABLE XXIV—*contd.*

Diseases. Average Strength—2,175	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>								
Rheumatic fever . . .	1	...	...	0·02	0·5	...	...	0·01
Sandfly fever . . .	22	...	1	0·34	10·1	...	0·46	0·16
Scarlet fever . . .	1	...	...	0·11	0·5	...	...	0·05
Small-pox . . .	...	...	...	...	...	...	...	...
Tuberculosis—								
Pulmonary . . .	...	...	...	...	...	...	...	...
Other . . .	...	...	...	...	...	...	...	...
Venereal diseases—								
Gonorrhoea . . .	1	...	...	0·09	0·5	...	...	0·04
Soft chancre . . .	...	...	...	...	...	...	...	...
Syphilis . . .	...	...	...	...	...	...	...	...
Other V. D. . .	...	...	...	...	...	...	...	...
Typhus fever . . .	...	...	...	...	...	...	...	...
Other diseases due to infection.	8	3	...	0·42	3·7	1·38	...	0·19
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system.	14	1	...	0·54	6·4	0·46	...	0·25
Mental diseases . . .	1	...	1	0·16	0·5	...	0·46	0·07
Diseases of the—								
Eye . . .	8	...	...	0·25	3·7	...	...	0·11
Ear and nose . . .	27	...	...	0·59	12·4	...	...	0·27

## TABLE XXIV.

## BRITISH OFFICERS OF THE INDIAN ARMY.

Table showing the Average Strength, Admissions into Hospital, Deaths, Numbers Invalided and Constantly Sick, during the year 1932, with the Ratios per 1,000 of the Strength.

Diseases. Average Strength—2,175	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection.</i>								
Cholera . . . .	...	...	...	...	...	...	...	...
Dengue . . . .	7	...	...	0·14	3·2	...	...	0·06
Diphtheria . . .	6	...	...	0·35	2·8	...	...	0·16
Dysentery—								
Bacillary . . .	10	...	...	0·30	4·6	...	...	0·14
„ Exudate . .	5	...	...	0·13	2·3	...	...	0·06
Amœbic . . . .	8	...	1	0·30	3·7	...	0·46	0·14
Clinical . . .	3	...	...	0·11	1·4	...	...	0·05
Enteric fever (inclusive of typhoid, para. A, B and C and enteric group).	7	...	...	0·62	3·2	...	...	0·29
Erysipelas . . .	1	...	...	0·07	0·5	...	...	0·03
Influenza . . . .	37	...	...	0·79	17·0	...	...	0·36
Malaria . . . .	72	...	...	1·54	33·1	...	...	0·71
Measles . . . .	1	...	...	0·39	0·5	...	...	0·18
Meningococcal infection (cerebrospinal fever).	...	...	...	...	...	...	...	...
Mumps . . . .	...	...	...	...	...	...	...	...
Plague . . . .	...	...	...	...	...	...	...	...
Pneumonia . . . .	6	3	...	0·50	2·8	1·38	...	0·23
Pyrexia of uncertain origin	1	...	...	0·06	0·5	...	...	0·03

## XXIII—concl'd.

Diarrhoea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandfly-fever.	Plague.	Influenza.	Pneumonia, Lobar and Lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
2.4	...	9.7	...	34.8	...	...	0.8	14.6	7.3	...	...	1330.6	13.57
2.2	...	12.1	...	59.4	1.8	0.9	...	1.8	7.1	...	...	229.7	6.20
3.7	...	31.7	...	135.4	0.5	3.2	...	2.1	7.9	...	...	501.8	25.22
2.8	...	18.4	...	80.4	0.9	1.5	0.2	4.8	7.4	...	...	348.4	14.58
1.3	...	20.4	1.3	159.4	...	...	...	...	3.8	...	...	422.2	21.42
55.6	...	...	...	...	...	...	...	...	...	...	...	55.6	1.67
8.2	...	4.7	...	49.1	...	...	...	12.8	17.5	...	...	300.2	12.76
...	...	28.6	...	85.7	...	...	...	...	85.7	...	...	371.4	9.43
1.9	...	...	...	123.6	...	...	...	1.9	7.5	...	...	217.2	6.74
...	...	4.1	...	192.6	...	...	...	...	4.1	...	...	881.1	9.61
1.4	...	17.8	...	53.3	...	...	...	31.4	1.4	...	...	343.4	18.87
14.3	...	14.3	...	57.1	...	...	...	28.6	...	...	...	557.1	32.86
20.8	...	10.4	...	31.2	...	...	...	...	...	...	...	270.8	9.79
3.8	...	10.4	0.3	103.2	...	...	...	10.2	7.7	...	...	335.9	14.66
3.2	...	15.1	0.4	30.5	5.2	...	0.8	6.3	5.2	...	...	236.7	10.21
5.7	...	17.1	1.9	3.8	...	...	...	13.3	...	...	...	245.2	10.17
11.0	...	5.5	...	14.7	...	...	...	73.2	3.7	...	...	362.6	15.64
...	...	...	...	5.2	5.2	...	...	10.3	...	...	...	72.2	2.53
...	...	...	...	...	...	...	...	...	...	...	...	360.9	12.80
17.5	...	17.5	...	87.7	...	...	...	...	17.5	...	...	350.9	21.23
4.7	...	13.2	0.5	24.0	3.6	...	0.5	16.8	4.7	...	...	219.9	10.76
23.9	...	63.6	...	176.6	52.5	...	...	...	4.0	...	...	688.1	27.75
41.4	...	33.1	...	230.4	...	...	...	2.3	7.5	...	...	932.7	30.05
...	...	23.9	...	177.5	...	...	...	...	...	...	...	399.3	8.94
...	...	83.6	...	126.2	26.3	...	0.9	0.9	8.2	...	...	472.3	28.72
9.9	...	29.7	...	240.9	112.2	...	...	1.6	4.9	...	...	661.7	12.79
19.8	...	40.6	...	188.7	35.5	...	0.2	1.1	5.9	...	...	699.7	25.47
6.1	0.0	10.6	0.2	145.0	1.7	15.2	0.0	10.2	7.8	...	0.1	432.0	15.68

N.B.—These figures have been compiled from Monthlies.

TABLE

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary.	Bacillary Exudate.	Protozoal.	Clinical.	
Belgaum . . .	1,237	...	...	...	...	...	0.8	...	...	...	...
Kirkee . . .	2,238	0.4	...	...	...	...	5.8	4.5	0.4	3.1	...
Poona . . .	1,891	0.5	0.5	...	...	1.6	13.2	11.6	1.6	3.7	1.6
Poona Bde. Area .	5,373	0.4	0.2	...	...	0.6	7.3	6.0	0.7	2.6	0.6
Mhow . . .	784	...	...	...	...	1.3	14.0	1.3	...	5.1	...
Mt. Abu . . .	18	...	...	...	...	...	...	...	...	...	...
Nasirabad . . .	856	...	1.2	...	...	1.2	8.2	4.7	...	1.2	...
Neemuch . . .	85	...	...	...	...	...	...	28.6	...	...	...
Ahmedabad . . .	534	...	...	...	...	3.7	...	...	1.9	...	...
Baroda . . .	488	...	...	...	...	...	...	2.0	2.0	6.1	...
Bombay . . .	732	...	...	...	...	1.4	4.1	2.7	5.5	4.1	...
Deolali . . .	70	...	...	...	...	...	...	...	14.3	25.6	...
Santa Cruz . . .	96	...	...	...	...	...	...	...	...	...	...
Bombay District .	3,644	...	0.3	...	...	1.4	5.8	2.5	1.9	3.6	...
Bangalore . . .	2,522	0.4	...	...	...	2.0	5.6	2.8	0.4	...	...
Cannanore . . .	526	...	...	...	...	...	...	...	...	...	...
Madras & St. Thos. Mount .	546	...	...	...	...	...	...	3.7	...	...	...
Trichinopoly . .	194	...	...	...	...	...	...	...	...	...	...
Trivandrum . . .	25	...	...	...	...	...	...	...	...	...	...
Wellington . . .	57	...	...	...	...	...	17.5	...	17.5	...	...
Madras District .	3,870	0.3	...	...	...	1.3	3.9	2.3	0.3	0.3	...
Mandalay . . .	1,257	...	...	...	...	...	4.0	...	...	...	...
Maymyo . . .	1,328	0.8	...	...	...	...	4.5	1.5	1.5	2.3	...
Meiktila . . .	298	...	...	...	...	...	6.8	10.2	...	3.4	...
Mingaladon . . .	1,101	...	...	...	...	...	14.5	7.3	1.8	0.9	...
Prome, Thayetmyo	606	3.3	...	...	...	...	16.5	...	8.2	1.6	...
Burma District .	4,585	0.7	...	...	...	...	8.5	2.8	2.0	1.3	...
ALL INDIA . . .	121,013	0.8	0.4	0.1	...	0.9	6.3	4.2	2.0	3.2	0.1

XXII—*contd.*

Diarrhoea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandy-fever.	Plague.	Influenza.	Pneumonia, Lobar and Lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
...	...	...	...	44.0	...	...	...	...	11.0	...	...	175.8	12.53
0.7	...	29.8	...	189.4	...	...	...	11.2	7.5	...	...	410.9	14.99
...	...	...	...	464.8	...	...	...	...	...	...	...	607.1	12.32
...	...	17.5	...	1,140.3	...	17.5	...	...	...	...	...	1,543.9	25.79
19.4	...	9.7	...	281.6	...	...	...	...	...	...	...	553.4	8.93
...	...	18.9	...	94.3	...	...	...	...	56.6	...	...	434.0	12.08
2.7	...	23.7	...	137.8	3.3	0.9	...	16.0	5.3	...	...	357.8	12.39
87.7	...	...	...	84.9	...	18.9	...	9.4	18.9	...	...	566.0	20.47
15.2	...	7.9	...	171.4	...	3.3	...	1.3	7.3	...	...	425.2	15.88
13.1	...	11.3	...	251.4	...	3.8	...	24.4	1.9	...	...	607.9	18.24
15.8	...	8.4	...	186.8	...	4.2	...	7.4	6.5	...	...	479.1	16.82
9.7	...	8.7	...	74.6	...	...	...	3.9	4.8	...	...	351.7	11.83
1.3	...	14.2	1.3	163.9	...	1.3	...	...	9.0	...	...	423.4	16.35
10.0	...	7.9	...	141.4	...	1.6	...	6.8	0.5	...	...	511.6	16.39
3.7	...	9.1	...	64.0	...	36.0	...	...	5.5	...	...	378.4	14.86
1.5	...	6.1	...	48.9	...	5.0	0.8	...	1.5	...	...	273.5	12.87
5.6	...	...	...	90.4	...	...	...	5.6	5.6	...	...	220.3	5.00
9.7	...	7.8	...	103.1	...	...	...	...	3.9	...	...	313.2	10.80
5.6	...	7.7	0.1	98.1	...	4.8	0.3	2.5	3.1	...	...	365.5	13.59

TABLE

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary.	Bacillary Exudate.	Protozoal.	Clinical.	
Gyantsé . . .	91	...	..	...	...	...	...	...	...	...	...
Shillong . . .	1,841	...	..	...	...	...	12.7	2.2	1.5	6.7	...
Comilla . . .	56	...	...	...	...	...	...	...	...	...	...
Bankura . . .	57	...	...	...	...	...	...	...	...	...	...
Midnapore . . .	103	...	...	...	...	...	...	...	...	...	...
Mymensingh . . .	58	...	...	...	...	...	...	...	...	...	...
Presidency and Assam District.	3,368	...	..	...	...	0.9	5.6	4.2	3.3	4.7	...
Agra . . .	106	...	...	...	...	...	...	...	...	...	...
Delhi . . .	1,511	1.3	...	...	...	0.7	...	1.3	0.7	1.3	...
Muttra . . .	533	3.8	...	...	...	3.8	1.9	9.4	...	15.0	...
Delhi Bde. Area .	2,152	1.9	...	...	...	1.4	0.5	3.3	0.5	4.6	...
Ahmednagar . . .	1,032	...	...	...	...	...	5.8	9.7	...	...	...
Aurangabad . . .	775	2.6	...	...	...	...	...	5.2	...	...	...
Jubbulpore . . .	1,902	...	...	...	...	1.6	23.7	6.8	1.1	2.6	...
Kamptee . . .	547	...	1.8	...	...	...	1.8	1.8	1.8	1.8	...
Trimulghery . . .	2,618	...	0.4	...	...	3.8	5.7	15.7	0.4	7.3	...
Pachmarhi . . .	354	...	...	...	...	...	5.6	2.8	...	...	...
Sangor . . .	514	...	...	...	...	...	...	...	1.9	...	...
Deccan District .	7,742	0.3	0.3	...	...	1.7	8.9	9.0	0.6	3.2	...

XXIII—*contd.*

Diarrhoea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, Lobar and Lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
...	...	10·8	...	206·1	...	...	...	...	10·8	...	...	392·6	13·47
6·9	...	9·5	...	67·4	...	3·1	...	...	6·9	...	...	514·2	16·82
...	...	...	...	52·6	...	...	...	...	...	...	...	315·8	8·95
2·3	0·5	11·7	...	245·4	...	...	...	...	7·7	...	...	501·1	18·81
3·8	...	20·4	...	244·4	...	...	...	0·4	4·3	...	...	535·0	17·90
17·3	...	8·4	0·9	102·8	...	2·7	...	31·0	17·3	...	...	401·0	16·87
2·7	...	22·4	...	59·3	...	12·6	...	3·6	5·9	...	...	362·7	16·93
...	...	...	...	206·0	...	...	...	...	8·6	...	...	279·0	3·43
16·9	...	16·9	...	84·7	...	...	...	...	...	...	...	152·5	10·85
3·5	...	2·8	...	63·2	...	...	...	...	3·5	...	...	202·2	8·41
5·8	0·1	13·3	0·2	140·3	...	3·3	...	6·1	7·9	...	...	422·8	16·06
...	...	22·2	...	136·7	...	...	...	...	3·5	...	...	522·2	20·54
4·9	...	8·1	...	82·9	...	16·3	...	...	4·9	...	...	518·7	19·33
20·8	...	20·8	...	166·7	...	...	...	...	...	...	...	458·3	23·75
...	...	8·1	...	77·1	...	1·4	...	...	9·5	...	...	299·1	10·91
5·1	...	32·5	...	88·0	...	3·4	...	6·8	...	...	...	285·5	13·30
6·3	...	25·3	...	310·1	...	...	...	...	31·6	...	...	525·3	16·46
6·1	...	20·4	...	39·8	...	11·7	...	...	4·6	...	0·5	355·0	17·55
...	...	57·7	...	...	...	...	...	...	...	...	...	269·2	10·19
4·1	...	19·4	...	83·0	...	7·1	...	0·8	5·5	...	0·2	393·1	16·81
2·1	...	26·1	...	52·1	7·8	...	...	27·5	1·4	...	...	280·5	11·16
51·3	...	...	...	25·6	...	51·3	...	...	25·6	...	...	435·9	13·85
14·3	...	...	...	85·7	...	...	...	...	14·3	...	...	300·0	5·43



[illegible]

## XXIII—contd.

Diarrhoea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, Lobar and Lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
6.4	...	3.5	0.5	396.2	...	73.8	...	8.9	4.5	...	...	755.3	23.29
...	...	19.6	...	372.5	...	9.8	...	...	9.8	...	...	637.3	22.55
34.8	...	121.7	...	191.3	...	...	...	...	8.7	...	...	1,078.3	30.96
1.2	...	10.9	...	200.0	...	54.5	...	...	2.4	...	1.2	461.8	14.15
3.8	...	5.4	...	95.3	...	...	...	8.8	9.0	...	...	401.6	17.47
2.5	...	7.6	...	318.1	...	26.7	...	...	11.4	...	2.5	604.3	10.33
...	...	2.7	...	347.3	...	9.9	...	14.3	6.9	...	1.5	566.9	14.98
3.2	...	6.1	0.1	241.3	...	20.8	...	9.0	7.3	...	0.7	533.1	17.23
15.6	...	2.0	...	111.6	...	4.1	...	22.3	11.5	...	...	292.3	7.69
...	...	...	...	49.5	...	17.7	...	...	3.5	...	...	208.5	4.98
2.0	0.1	5.6	...	89.0	...	1.2	...	23.7	8.7	...	...	377.1	16.45
4.2	0.1	4.8	...	91.4	...	2.2	...	22.7	8.4	...	...	358.2	14.68
32.7	...	3.3	...	461.4	...	40.2	...	1.9	8.4	...	...	737.7	15.39
3.8	...	2.9	1.0	201.0	...	14.4	...	1.0	2.9	...	...	291.9	8.21
23.2	...	3.1	0.3	375.8	...	31.7	...	1.6	6.6	...	...	591.2	13.03
...	...	...	...	361.1	...	13.9	...	...	...	...	...	500.0	13.33
1.2	...	7.7	1.2	236.8	3.0	2.4	...	...	7.1	...	...	436.2	13.57
1.1	...	7.2	1.1	235.7	2.8	2.8	...	...	6.7	...	...	427.6	13.21

TABLE

Stations and Districts.	Average Annual Strength	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary.	Bacillary Exudate.	Protozoal.	Clinical.	
Bannu . . . .	2,019	0.5	0.5	2.0	...	1.0	7.4	0.5	2.0	3.5	0.5
D. I. Khan . . .	102	...	...	...	...	9.8	...	...	...	...	...
Kalabagh and M. I.	115	...	...	8.7	...	...	...	...	...	...	...
Manzai . . . .	825	1.2	3.6	...	...	3.6	1.2	...	...	2.4	...
Rezmak . . . .	4,796	0.6	0.2	0.2	...	0.2	7.5	0.4	0.8	3.3	0.2
Mir Ali . . . .	786	2.5	1.3	...	...	...	2.5	1.3	...	...	...
Wana . . . .	3,346	0.6	...	...	...	..	5.4	5.7	...	3.6	...
Waziristan Dist.	11,591	0.7	0.5	0.5	...	0.6	6.0	1.9	0.7	3.1	0.2
Chaman . . . .	1,478	2.0	...	...	...	0.7	4.1	3.4	...	1.4	...
Hindubagh . . .	283	...	...	...	...	...	...	...	...	...	...
Quetta . . . .	7,385	2.4	0.8	...	...	0.7	15.3	7.6	16.8	4.7	0.1
Beluchistan Dist.	9,146	2.3	0.7	...	...	0.7	13.0	6.7	13.6	4.6	0.1
Fort Sandeman . .	2,139	...	0.5	...	...	...	2.8	1.9	0.5	0.9	...
Loralai . . . .	1,045	1.0	...	...	...	...	...	...	...	...	...
Zhob Bde. Area . .	3,185	0.3	0.3	...	...	...	1.9	1.3	0.3	0.6	...
Hyderabad . . .	72	...	...	...	...	...	...	...	...	13.9	...
Karachi . . . .	1,685	3.0	...	0.6	...	...	20.8	0.6	2.4	6.5	...
Sind Bde. Area . .	1,803	2.8	...	0.6	...	...	19.4	0.6	2.2	6.7	...

XXIII—*contd.*

Diarrhoea.	Cholera.	Veneral diseases.	Small-pox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia, Lobar and Lobular.	Heat-stroke.	Heat-exhaustion.	All causes.	Average number constantly sick.
3·6	...	3·6	...	93·2	...	28·7	...	...	...	...	...	358·4	8·39
12·9	...	7·9	...	41·1	...	8·4	...	...	9·9	...	...	360·9	14·22
...	...	16·7	...	50·0	...	...	...	...	...	...	...	175·0	4·25
1·7	...	10·7	...	48·1	...	5·3	...	5·3	5·3	...	...	459·9	30·43
...	...	...	...	350·0	...	...	...	...	25·0	...	...	825·0	10·75
12·7	...	10·2	0·2	135·1	...	9·3	...	3·2	13·4	...	...	378·1	15·87
...	...	...	...	63·8	...	21·3	...	21·3	42·6	...	...	446·8	11·26
10·3	0·2	7·7	0·2	123·8	...	7·2	...	6·4	10·5	...	...	380·5	14·24
1·6	...	6·1	0·4	146·4	0·4	13·5	...	1·2	8·2	...	...	459·4	15·59
4·8	...	19·0	...	66·7	0·5	4·8	...	...	14·3	...	...	304·8	8·19
11·0	...	11·0	...	227·4	...	...	...	...	4·9	...	...	397·3	13·73
...	...	...	...	100·0	...	...	...	...	...	...	...	200·0	10·00
...	...	...	...	...	...	...	...	...	...	...	...	76·9	6·92
4·9	...	4·9	...	153·5	...	...	...	...	22·3	...	...	375·0	12·19
4·0	...	8·5	...	66·3	...	3·5	...	45·7	14·1	...	...	369·5	14·90
...	...	5·3	...	111·6	...	19·6	...	27·0	11·1	...	...	458·0	17·72
16·3	...	32·5	...	24·4	...	...	...	8·1	56·9	...	...	459·9	27·97
5·2	...	9·9	...	110·8	...	8·6	...	70·4	12·9	...	...	469·7	20·06
4·8	...	9·5	...	62·9	...	3·4	...	6·0	6·0	...	...	381·0	13·87
...	...	...	...	...	...	...	...	...	...	...	...	375·0	15·00
9·2	...	0·7	0·4	78·1	...	1·4	...	...	7·4	...	0·4	281·3	11·20
...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...
4·8	...	6·6	0·1	106·1	0·2	7·1	...	21·3	10·7	...	0·1	390·4	14·83

TABLE

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary.	Bacillary Exudate.	Protozoal.	Clinical.	
Campbellpore . . .	279	3.6	...	...	...	...	3.6	7.2	...	3.6	...
Jhelum . . . . .	2,020	1.0	...	...	...	...	0.5	2.0	...	2.0	...
Kalabagh (Hazara) .	120	...	...	...	...	...	...	25.0	...	...	...
Kuldana . . . . .	187	...	...	...	...	...	...	...	...	5.3	5.3
Mona . . . . .	40	...	...	...	...	...	...	...	...	...	...
Rawalpindi . . . .	4,404	0.5	1.1	...	...	1.1	1.1	2.0	1.1	5.4	...
Sargodha . . . . .	47	...	...	...	...	...	...	...	...	...	...
<i>Rawalpindi District.</i>	11,083	0.9	0.5	...	...	0.5	0.6	1.8	1.3	3.7	0.1
Ambala . . . . .	2,453	1.2	...	...	...	1.2	10.2	5.3	...	9.0	...
Amritsar . . . . .	210	...	...	...	...	...	...	...	...	...	...
Bakloh . . . . .	818	1.2	...	...	...	1.2	1.2	6.1	...	2.4	...
Dagshai . . . . .	10	...	...	...	...	...	...	...	...	...	...
Dalhousie . . . . .	13	...	...	...	...	...	...	...	...	...	...
Dharamsala . . . .	808	...	...	...	...	1.2	3.7	...	1.2	3.7	...
Ferozepore . . . .	1,992	0.5	...	...	...	1.0	3.0	3.5	...	3.0	...
Jullundur . . . . .	1,891	0.5	...	...	...	...	...	0.5	2.1	1.0	...
Jutogh . . . . .	123	...	...	...	...	...	...	16.3	8.1	48.8	...
Lahore . . . . .	2,329	0.4	0.4	...	...	3.0	5.2	3.9	2.1	6.4	...
Multan . . . . .	1,160	...	0.9	...	...	0.9	1.7	...	...	1.7	...
Subathu . . . . .	8	...	...	...	...	...	...	...	...	...	...
Sialkot . . . . .	2,830	0.7	...	...	...	1.1	0.7	0.7	1.1	0.7	...
Simla . . . . .	100	...	...	...	...	...	...	...	...	...	...
Solan . . . . .	2	...	...	...	...	...	...	...	...	...	...
<i>Lahore Dist.</i>	14,907	0.6	0.1	...	...	1.2	3.4	2.6	0.9	4.0	...

## XXIII.

INDIAN OTHER RANKS—*contd.**diseases in each Station and District in India during the year 1932.*

				Pneumonia Lobular		Hc		Average and number stock.	
Mi									
3.1	9.4	181.5	40.7	17.2	14.1		536.8	15.26	
		164.7	3.9		7.8		387.3	4.16	
	16.1				16.1		145.2	1.61	
		116.1					288.9	16.06	
	5.7	109.2	17.2				241.4	20.57	
1.3	2.5	126.1	11.5		1.3		287.9	8.45	
33.6	7.8	105.9	23.3		2.6		413.4	14.37	
3.3	3.3	155.2	218.7	45.8	8.8		642.2	18.43	
...	18.1	252.7	2.2	...	2.2	2.2	408.1	12.53	
1.0	5.1	155.2	13.1	2.0	7.1		354.8	11.83	
1.1	11.1	108.0	6.8	13.3	8.6		359.2	13.05	
3.8	13.6	218.3	101.2	11.2	10.4	10.6	644.4	24.63	
	6.1	113.3	8.5	36.5	11.0		460.4	16.57	
3.0	9.2	0.5	158.4	67.0	14.8	8.3	0.3	487.4	17.14
9.6	3.2	115.4	3.2		9.6		294.9	7.76	
...	9.6	201.9					538.5	9.04	
5.6	4.5	277.9	32.6	0.3	8.0		588.7	19.79	
10.4	2.3	176.3	30.2		13.9	1.2	438.5	11.69	
6.3	4.4	246.9	28.5	0.2	8.6	0.0	543.3	17.10	
7.5	0.5	4.9	0.3	162.7	3.1	14.8	8.6	396.4	12.57
		44.9						202.2	6.97

[illegible]

## XXII.

## INDIAN OTHER RANKS—contd.

admissions for certain diseases for all-India during the year 1932.

Pyrexia of uncertain origin.	Pneumonia, Lobar and Lobular.	Diarrhoea.	Dengue.	Sandfly fever.	Plague.	Colitis.	Effects of heat.	All causes.
0.02	1.3	0.2	0.03	0.0	0.02	...	...	28.9
...	0.7	0.2	0.04	0.0	0.01	...	...	20.3
0.01	0.8	0.3	0.02	0.1	0.01	...	0.02	22.2
...	0.5	0.6	0.10	1.1	...	...	...	26.9
...	0.5	0.8	0.04	2.1	...	0.02	0.04	32.0
...	0.3	0.7	0.30	2.8	...	...	0.01	33.9
...	0.3	0.5	0.30	3.7	...	0.02	0.10	38.3
...	0.3	0.9	0.10	3.2	...	0.01	0.01	50.9
0.02	0.3	0.8	0.40	2.1	...	...	0.01	53.0
...	0.4	0.5	0.10	0.7	0.02	0.03	...	46.0
0.01	0.7	0.5	0.20	0.1	...	0.02	...	42.5
0.01	1.5	0.3	0.03	0.0	...	0.02	..	37.7
0.10	7.8	6.1	1.70	15.2	0.05	0.10	0.10	432.0

omplied from Monthlies.



## TABLE

## INDIAN OFFICERS AND

*Table showing monthly ratios per 1,000 of strength of*

Months.	Enteric group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery Protozoal.	Dysentery Bacillary.	Dysentery Bacillary Exudate.	Dysentery Group.
January	0.1	1.4	...	0.02	5.4	0.6	0.3	0.1	0.1
February	0.1	0.7	...	0.01	2.7	0.1	0.2	0.1	0.1
March	0.1	0.9	...	0.01	3.0	0.1	0.2	0.2	0.2
April	0.3	0.4	...	0.03	4.4	0.1	0.5	0.3	0.3
May	0.2	0.5	...	0.02	6.9	0.1	0.5	0.4	0.4
June	0.3	0.2	...	...	9.1	0.2	0.4	0.2	0.2
July	0.3	0.2	0.01	...	12.3	0.2	0.6	0.4	0.3
August	0.2	0.1	0.01	0.01	20.2	0.5	1.2	1.0	0.5
September	0.3	0.2	0.02	...	26.2	0.5	0.9	0.7	0.3
October	0.2	0.5	...	0.01	23.6	0.1	0.5	0.3	0.3
November	0.1	1.4	...	0.02	20.9	0.0	0.6	0.3	0.3
December	0.04	3.3	...	0.10	10.0	0.1	0.3	0.3	0.2
TOTAL	2.1	10.2	0.03	0.2	145.0	2.0	6.3	4.2	3.2

*N.B.*—These figures have been

**TABLE XXII.**

---

TABLE XXI—*concl'd.*

Diseases. Average Strength 4,585.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>								
Diseases of the—								
Skin—								
Scabies . . . . .	53	...	...	2.33	11.6	...	...	0.51
Other diseases . . . . .	82	...	1	3.17	17.9	...	0.22	0.69
Urinary system . . . . .	6	...	...	0.25	1.3	...	...	0.05
Injuries—								
General . . . . .	...	...	...	...	...	...	...	...
Local . . . . .	291	1	3	10.67	63.5	0.22	0.65	2.33
In action . . . . .	...	...	...	...	...	...	...	...
Tumours and cysts . . . . .	7	...	...	0.29	1.5	...	...	0.05
Malformations . . . . .	...	...	...	...	...	...	...	...
Poisons . . . . .	1	...	...	0.02	0.2	...	...	0.00
Parasites—								
Animal . . . . .	156	...	1	5.79	34.0	...	0.22	1.26
Vegetable . . . . .	...	...	...	...	...	...	...	...
No appreciable disease . . . . .	3	...	...	0.09	0.7	...	...	0.02
N. Y. D. other causes . . . . .	4	...	...	0.03	0.9	...	...	0.01
Anti-rabic treatment . . . . .	...	...	...	...	...	...	...	...
Cause unknown . . . . .	...	...	...	...	...	...	...	...
Suicides* . . . . .	...	(1)	...	...	...	(0.22)	...	...
TOTAL	3,034	14	65	112.67	661.7	3.05	14.18	24.57

\* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XXI—*contd.*

Diseases. Average Strength, 4,585.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
Diseases of the—								
Blood . . . . .	14	...	2	1.29	3.1	...	0.44	0.23
Spleen . . . . .	...	...	...	...	...	...	...	...
Lymphatic system . . . . .	16	...	1	1.44	3.5	...	0.22	0.31
Endocrine glands . . . . .	...	...	...	...	...	...	...	...
Breast . . . . .	1	...	...	0.02	0.2	...	...	0.00
Respiratory system—								
Larynx and trachea . . . . .	7	...	...	0.13	1.5	...	...	0.03
Bronchi and bronchioles . . . . .	136	...	5	5.01	29.7	...	1.09	1.09
Lung, other than tuberculosis and pneumonia.	...	...	...	...	...	...	...	...
Other diseases . . . . .	10	...	7	1.40	2.2	...	1.53	0.31
Diseases of the—								
Teeth and gums . . . . .	36	...	...	1.00	7.9	...	...	0.22
Digestive system—								
Inflammation of— Tonsils . . . . .	28	...	...	0.67	6.1	...	...	0.15
Liver . . . . .	21	1	1	1.44	4.6	0.22	0.22	0.31
Other diseases . . . . .	464	1	...	10.87	101.2	0.22	...	2.37
Diseases due to disorders of nutri- tion or of metabolism.	4	...	...	0.08	0.9	...	...	0.02
Diseases of the—								
Generative system . . . . .	37	...	...	1.76	8.1	...	...	0.38
Organs of locomotion . . . . .	75	...	2	3.61	16.4	...	0.44	0.79
Areolar tissue . . . . .	163	...	...	5.27	35.6	...	...	1.15

TABLE XXI—*contd.*

Diseases. Average Strength, 4,585.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection</i> —contd.								
Rheumatic fever . . . .	2	...	...	0·18	0·4	...	...	0·04
Sandfly fever . . . .	...	...	..	...	...	...	...	...
Scarlet fever . . . .	...	...	...	...	...	...	...	...
Small-pox . . . .	1	...	...	0·06	0·2	...	...	0·01
Tuberculosis— Pulmonary . . . .	19	1	22	2·21	4·1	0·22	4·80	0·48
Other . . . .	1	1	2	0·34	0·2	0·22	0·44	0·07
Veneral diseases— Gonorrhoea . . . .	89	...	...	8·88	19·4	...	...	1·94
Soft chancre . . . .	30	...	...	3·33	6·5	...	...	0·73
Syphilis . . . .	57	...	...	5·55	12·4	...	...	1·21
Other V. D. . . .	...	...	...	...	...	...	...	...
N. Y. D. venereal . . . .	4	...	...	0·10	0·9	...	...	0·02
Typhus fever . . . .	...	...	...	...	...	...	...	...
Other diseases due to infection	9	...	...	0·53	2·0	...	...	0·12
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system .	10	...	4	0·93	2·2	...	·87	0·20
Mental diseases . . . .	3	...	2	0·28	0·7	...	0·44	0·06
Diseases of the —								
Eye . . . .	44	...	2	1·88	9·6	...	0·44	0·41
Ear and nose . . . .	89	1	3	2·72	19·4	0·22	0·65	0·59
Circulatory system— Valvular diseases of the heart .	3	...	3	0·18	0·7	...	0·65	0·04
Disordered action of the heart .	2	...	1	0·31	0·4	...	0·22	0·07
Other diseases . . . .	3	...	2	0·40	0·7	...	0·44	0·09



TABLE XX—concl'd.

Diseases. Average Strength, 20,629.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>								
Diseases of the—								
Skin—								
Scabies . . . . .	104	...	...	7.15	9.4	...	...	0.35
Other diseases . . . . .	187	...	5	8.33	9.1	...	0.24	0.40
Urinary system . . . . .	44	3	1	3.39	2.1	0.15	0.05	0.16
Injuries —								
General . . . . .	4	2	...	0.11	0.2	0.10	...	0.01
Local . . . . .	758	4	18	35.00	36.7	0.19	0.87	1.70
In action . . . . .	...	...	...	...	...	...	...	...
Tumours and cysts . . . . .	29	...	1	1.51	1.4	...	0.05	0.07
Malformations . . . . .	1	...	...	0.22	0.0	...	...	0.01
Poisons . . . . .	5	...	...	0.11	0.2	...	...	0.01
Parasites—								
Animal . . . . .	182	...	3	12.23	8.8	...	0.15	0.59
Vegetable . . . . .	...	...	...	...	...	...	...	...
No appreciable disease . . . . .	8*	...	...	0.38	0.4	...	...	0.02
N. Y. D. other causes . . . . .	...	...	...	...	...	...	...	...
Anti-rabic treatment . . . . .	...	...	...	...	...	...	...	...
Cause unknown . . . . .	...	...	...	...	...	...	...	...
Suicides*. . . . .	...	...	...	...	...	...	...	...
TOTAL . . . . .	6,884	43	139	278.34	333.7	2.08	6.74	13.49

\* This includes 1 case of Enteric carrier.

TABLE XX—*contd.*

Diseases. Average Strength. 20,629.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
Diseases of the—								
Blood . . . . .	29	...	...	2.64	1.4	...	...	0.13
Spleen . . . . .	5	...	...	0.60	0.2	...	...	0.03
Lymphatic system . . . .	43	...	1	3.50	2.1	...	...	0.17
Endocrine glands . . . .	3	...	1	0.11	0.1	...	...	0.01
Breast . . . . .	3	...	1	0.11	0.1	...	...	0.01
Respiratory system—								
Larynx and trachea . . .	35	...	...	0.89	1.7	...	...	0.04
Bronchi and bronchioles .	295	2	9	11.10	14.3	0.10	0.44	0.54
Lung (other than tuberculosis and pneumonia).	3	...	1	0.49	0.1	...	0.05	0.02
Other diseases . . . . .	35	1	...	2.06	1.7	0.05	...	0.10
Diseases of the—								
Teeth and gums . . . . .	51	...	1	1.15	2.5	...	0.05	0.06
Digestive system—								
Inflammation of tonsils .	139	...	...	3.39	6.7	...	...	0.16
Liver diseases . . . . .	62	2	1	3.65	3.0	0.10	0.05	0.18
Other diseases . . . . .	656	1	3	18.10	31.8	0.05	0.15	0.88
Diseases due to disorders of nutri- tion or of metabolism.	5	...	3	0.34	0.2	...	0.15	0.02
Diseases of the—								
Generative system. . . . .	66	...	...	2.65	3.2	...	...	0.13
Organs of locomotion . . .	171	...	9	8.37	8.3	...	0.44	0.41
Areolar tissue . . . . .	508	...	1	16.89	24.6	...	0.05	0.82



TABLE XX—*contd.*

Diseases. Average Strength, 20,629.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>								
Rheumatic fever . . . .	13	...	1	1.31	0.6	...	0.05	0.06
Sandfly fever . . . .	49	...	...	1.19	2.4	...	...	0.06
Scarlet fever . . . .	...	...	...	...	...	...	...	...
Small-pox . . . .	4	1	...	0.27	0.2	0.05	...	0.01
Tuberculosis :—								
Pulmonary . . . .	30	1	35	3.62	1.5	0.05	1.70	0.18
Other . . . .	2	...	2	0.42	0.1	...	0.10	0.02
Venereal diseases—								
Gonorrhœa . . . .	105	...	3	13.84	5.1	...	0.15	0.67
Soft chancre . . . .	57	...	...	5.38	2.8	...	...	0.26
Syphilis . . . .	95	...	1	9.82	4.6	...	0.05	0.48
Other V. D. . . .	...	...	...	...	...	...	...	...
N. Y. D. venereal . . . .	...	...	...	...	...	...	...	...
Typhus fever . . . .	7	...	...	0.52	0.3	...	...	0.03
Other diseases due to infection .	41	...	2	3.51	2.0	...	0.10	0.17
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system .	71	2	8	4.29	3.4	0.10	0.39	0.21
Mental diseases . . . .	8	...	6	0.67	0.4	...	0.29	0.03
Diseases of the—								
Eye . . . .	217	...	9	8.84	10.5	...	0.44	0.43
Ear and nose . . . .	201	...	7	5.26	9.7	...	0.34	0.25
Circulatory system—								
Valvular diseases of the heart .	2	...	3	0.26	0.1	...	0.15	0.01
Disordered action of the heart .	5	3	1	0.18	0.2	0.15	0.05	0.01
Other diseases . . . .	18	4	2	1.12	0.9	0.19	0.10	0.05

TABLE XX.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

## SOUTHERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths, Numbers Invalided and Constantly Sick during the year 1932 with the Ratios per 1,000 of the Strength.*

Diseases. Average, Strength 20,629.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection.</i>								
Cholera . . . . .	...	...	...	...	...	...	...	...
Dengue . . . . .	22	..	...	0.58	1.1	...	...	0.03
Diphtheria . . . . .	4	..	...	0.31	0.2	...	...	0.01
Dysentery—								
Bacillary . . . . .	152	..	...	6.25	7.4	...	...	0.30
,, exudate . . . . .	125	...	...	4.78	6.1	...	...	0.23
Amoebic . . . . .	18	...	...	1.67	0.9	...	...	0.08
Clinical . . . . .	56	...	...	1.99	2.7	...	...	0.10
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	36	1		4.32	1.7	0.05		0.21
Erysipelas . . . . .	...	...		...	...	...	...	...
Influenza . . . . .	152	...	...	4.42	7.4	...	...	0.21
Malaria . . . . .	1,632	...	...	34.11	79.1	...	...	1.65
Measles . . . . .	5	..		0.24	0.2	...	...	0.01
Meningococcal infection (cerebro-spinal fever).	1	1	...	0.10	0.0	0.05	...	0.00
Mumps . . . . .	110	...	...	5.58	5.3	0.24	...	0.27
Plague . . . . .	5	5	...	0.11	0.2		...	0.01
Pneumonia . . . . .	111	10	1	8.08	5.4	0.48	0.05	0.39
Pyrexia of uncertain origin .	9	...	...	0.80	0.4	...	...	0.04

TABLE XIX—*conold.*

Diseases. Average Strength, 23,753.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—conold.</i>								
Diseases of the—								
Skin—								
Scabies . . . .	148	...	...	5.41	6.2	...	...	0.23
Other diseases . . . .	283	...	2	12.82	11.9	...	0.08	0.54
Urinary system . . . .	36	1	3	2.29	1.5	0.04	0.13	0.10
Injuries—								
General . . . .	1	1	...	0.05	0.0	0.04	...	0.00
Local . . . .	1,092	8	24	56.95	46.0	0.34	1.01	2.40
In action . . . .	...	...	...	...	...	...	...	...
Tumours and cysts . . . .	24	1	1	1.21	1.0	0.04	0.04	0.05
Malformations . . . .	...	...	...	...	...	...	...	...
Poisons . . . .	5	...	1	0.48	0.2	...	0.04	0.02
Parasites—								
Animal . . . .	192	1	1	10.08	8.1	0.04	0.04	0.42
Vegetable . . . .	...	...	...	...	...	...	...	...
No appreciable disease . . . .	14	...	...	0.23	0.6	...	...	0.01
N. Y. D. other causes . . . .	...	...	...	...	...	...	...	...
Anti-rabic treatment . . . .	...	...	...	...	...	...	...	...
Cause unknown . . . .	...	...	...	...	...	...	...	...
Suicides* . . . .	(1)	(1)	...	(0.11)	(0.0)	(0.04)	...	(0.00)
TOTAL	9,716	53	157	380.80	409.0	2.23	6.61	16.03

\* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in total.

TABLE XIX—*contd.*

Diseases. Average Strength, 23,753.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
Diseases of the—								
Blood . . . . .	28	...	1	2.35	.2	...	0.04	0.10
Spleen . . . . .	2	...	...	0.16	0.1	...	...	0.01
Lymphatic system . . . .	45	...	...	3.88	1.9	...	...	0.16
Endocrine glands . . . .	6	...	1	0.21	0.3	...	0.04	0.01
Breast . . . . .	2	...	...	0.05	0.1	...	...	0.00
Respiratory system—								
Larynx and trachea . . . .	19	...	...	0.55	0.8	...	...	0.02
Bronchi and bronchioles . .	335	...	3	10.17	14.1	...	0.13	0.43
Lung (other than tuberculosis and pneumonia).	...	...	...	...	...	...	...	...
Other diseases . . . . .	54	1	2	3.89	2.3	0.04	0.08	0.16
Diseases of the—								
Teeth and gums . . . . .	49	...	2	1.52	2.1	...	0.08	0.06
Digestive system—								
Inflammation of tonsils . .	112	...	...	2.83	4.7	...	...	.12
Liver diseases . . . . .	125	1	2	7.22	5.3	0.04	0.08	0.30
Other diseases . . . . .	855	5	2	24.07	36.0	0.21	0.08	1.01
Diseases due to disorders of nutri- tion or of metabolism.	...	...	...	...	...	...	...	...
Diseases of the—								
Generative system . . . . .	86	...	...	3.96	3.6	...	...	0.17
Organs of locomotion . . . .	210	...	10	11.51	8.8	...	0.42	0.48
Areolar tissue . . . . .	810	2	2	28.58	34.1	0.08	0.08	1.20

TABLE XIX—*contd.*

Diseases. Average Strength, 23,753.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>								
Pyrexia of uncertain origin . . . . .	2	...	...	0·09	0·1	...	...	0·00
Rheumatic fever . . . . .	13	...	...	0·90	0·5	...	...	0·04
Sandfly fever . . . . .	96	...	...	1·78	3·8	...	...	0·07
Scarlet fever . . . . .	...	...	...	...	...	...	...	...
Small-pox . . . . .	2	...	...	0·14	0·1	...	...	0·01
Tuberculosis— Pulmonary . . . . .	65	6	57	4·79	2·7	0·25	2·40	0·20
Other . . . . .	4	1	4	0·61	0·2	0·04	0·17	0·03
Venereal diseases— Gonorrhoea . . . . .	216	...	1	22·73	9·1	...	0·04	0·96
Soft chancre . . . . .	54	...	...	5·12	2·3	...	...	0·22
Syphilis . . . . .	106	...	2	10·07	4·5	...	0·08	0·42
Other V. D. . . . .	2	...	1	0·28	0·1	...	0·04	0·01
N. Y. D. venereal . . . . .	...	...	...	...	...	...	...	...
Typhus fever . . . . .	...	...	...	...	...	...	...	...
Other diseases due to infection . . . . .	58	1	2	4·72	2·4	0·04	0·08	0·20
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system . . . . .	56	...	7	3·44	2·4	...	0·29	0·14
Mental diseases . . . . .	6	1	3	0·44	0·3	0·04	0·13	0·02
Diseases of the— Eye . . . . .	352	...	9	13·77	14·8	...	0·38	0·58
Ear and nose . . . . .	211	...	6	6·11	8·9	...	0·25	0·25
Circulatory system— Valvular diseases of the heart . . . . .	2	...	1	0·07	0·1	...	0·04	0·00
Disordered action of the heart . . . . .	6	1	1	0·20	0·3	0·04	0·04	0·01
Other diseases . . . . .	8	1	2	0·38	0·3	0·04	0·08	0·02

## TABLE XIX.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

## EASTERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths, Numbers Invalided and Constantly Sick during the year 1932, with the Ratios per 1,000 of the Strength.*

Diseases. Average Strength, 23,753.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection.</i>								
Cholera . . . . .	1	2	...	0.01	0.0	0.08	...	0.00
Dengue . . . . .	11	...	...	0.18	0.5	...	...	0.01
Diphtheria . . . . .	...	...	...	...	...	...	...	...
Dysentery—								
Bacillary . . . . .	156	2	1	6.21	6.6	0.08	0.04	0.26
Bacillary exudate . . . . .	117	...	...	4.40	4.9	...	...	0.19
Amoebic . . . . .	42	...	...	2.54	1.8	...	...	0.11
Clinical . . . . .	60	...	...	2.16	2.5	...	...	0.09
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	47	3	...	6.93	2.0	0.13	...	0.29
Erysipelas . . . . .	1	...	...	0.06	0.0	...	...	0.00
Influenza . . . . .	156	...	...	2.73	6.6	...	...	0.11
Malaria . . . . .	3,088	...	3	71.72	130.0	...	0.13	3.02
Measles . . . . .	31	...	...	1.64	1.3	...	...	0.07
Meningococcal infection (cerebro-spinal fever).	2	2	...	0.02	0.1	0.03	...	0.00
Mumps . . . . .	52	...	...	3.93	2.2	...	...	0.16
Plague . . . . .	...	...	...	...	...	...	...	...
Pneumonia . . . . .	166	12	...	12.21	7.0	0.51	...	0.51

TABLE XVIII—*conold.*

Diseases. Average Strength, 14,134.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—conold.</i>								
Diseases of the—								
Generative system . . . .	28	...	...	1.52	2.0	...	...	0.11
Organs of locomotion . . . .	118	...	4	5.33	8.3	...	0.28	0.38
Areolar tissue . . . .	204	...	...	7.16	14.4	...	...	0.51
Skin diseases—								
Scabies . . . .	11	...	...	0.43	0.8	...	...	0.03
Other diseases . . . .	137	..	...	5.78	9.7	...	...	0.41
Diseases of the—								
Urinary system . . . .	28	1	...	1.52	2.0	0.07	..	0.11
Injuries—								
General . . . .	...	...	...	...	...	...	...	...
Local . . . .	450	4	9	23.44	32.5	0.28	0.64	1.66
In action . . . .	...	...	...	...	...	...	...	...
Tumours and cysts . . . .	13	...	...	0.48	0.9	...	...	0.03
Malformations . . . .	1	...	...	0.06	0.1	...	...	0.00
Poisons . . . .	2	...	...	0.03	0.1	...	...	0.00
Parasites—								
Animal . . . .	161	...	...	6.01	11.4	...	...	0.43
Vegetable . . . .	..	...	...	...	...	...	...	...
No appreciable diseases . . . .	23	...	1	0.60	1.6	...	0.07	0.04
N. Y. D. (other causes) . . . .	...	...	...	...	...	...	...	...
Suicides* . . . .	..	(1)	...	...	...	(0.07)	...	...
TOTAL	5,930	30	68	199.70	419.6	2.12	4.81	14.13

\* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE XVIII—*contd.*

Diseases. Average Strength, 14,134.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
Diseases of the—								
Circulatory system—								
Valvular diseases of the heart .	2	...	2	0.20	0.1	...	0.14	0.01
Disordered action of the heart .	1	...	...	0.04	0.1	...	...	0.00
Other diseases . . . . .	7	1	1	0.58	0.5	0.07	0.07	0.04
Blood . . . . .	24	...	2	2.01	1.7	...	0.14	0.14
Spleen . . . . .	4	...	...	0.08	0.3	...	...	0.01
Lymphatic system . . . . .	8	1	...	0.75	0.6	0.07	...	0.05
Endocrine glands . . . . .	...	...	...	...	...	...	...	...
Breast . . . . .	...	...	...	...	...	...	...	...
Respiratory system—								
Larynx and trachea . . . . .	2	...	...	0.06	0.1	...	...	0.00
Bronchi and bronchioles . . . .	208	...	2	6.35	14.7	...	0.14	0.45
Lung (other than tuberculosis and pneumonia).	...	...	...	...	...	...	...	...
Other diseases . . . . .	18	...	1	1.23	1.3	...	0.07	0.09
Diseases of the—								
Teeth and gums . . . . .	29	...	...	0.76	2.1	...	...	0.05
Digestive system—								
Inflammation of the tonsils . .	86	...	...	2.21	6.1	...	...	0.16
Liver diseases . . . . .	68	...	...	3.85	4.8	...	...	0.27
Other diseases . . . . .	462	...	2	13.27	32.7	...	0.14	0.94
Diseases due to disorders of nutri- tion or of metabolism.	1	...	...	0.21	0.1	...	...	0.01



TABLE XVIII—*contd.*

Diseases. Average Strength 14,134.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>								
Sandfly-fever . . . . .	126	...	...	1·89	8·9	...	...	0·13
Scarlet fever . . . . .	...	...	...	...	...	...	...	...
Small-pox . . . . .	3	...	...	0·27	0·2	...	...	0·02
Tuberculosis—								
Pulmonary . . . . .	16	2	17	2·18	1·1	0·14	1·20	0·15
Other . . . . .	10	...	7	1·74	0·7	...	0·50	0·12
Venereal diseases—								
Gonorrhœa . . . . .	30	...	1	3·10	2·1	...	0·07	0·22
Soft chancre . . . . .	14	...	...	1·88	1·0	...	...	0·13
Syphilis . . . . .	26	...	...	2·32	1·8	...	...	0·16
Other v. d. . . . .	...	...	...	...	...	...	...	...
N. Y. D, venereal . . . . .	...	...	...	...	...	...	...	...
Typhus fever . . . . .	...	...	...	...	...	...	...	...
Other diseases due to infection .	37	2	1	2·83	2·6	0·14	0·07	0·20
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system .	45	2	7	2·20	3·2	0·14	0·50	0·16
Mental diseases . . . . .	...	...	...	...	...	...	...	...
Diseases of the—								
Eye . . . . .	119	...	7	6·23	8·4	...	0·50	0·44
Ear and nose . . . . .	72	...	3	2·36	5·1	...	0·21	0·17

## TABLE XVIII.

INDIAN OFFICERS AND INDIAN OTHER RANKS—*contd.*

## WESTERN COMMAND.

*Table showing the Average Strength, Admissions into Hospitals, Deaths, Numbers Invalided and Constantly Sick during the year 1932 with the Ratios per 1 000 of Strength.*

Diseases. Average Strength 14,134.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection.</i>								
Cholera . . . . .	1	..	..	0·02	0·1	...	...	0·00
Dengue . . . . .	5	...	...	0·11	0·4	...	...	0·01
Diphtheria . . . . .	1	...	..	0·02	0·1	...	...	0·00
Dysentery . { Bacillary . . . . .	179	...	1	6·03	12·7	...	0·07	0·43
	67	...	...	2·01	4·7	...	...	0·14
Amoebic . . . . .	136	...	..	7·29	9·6	...	...	0·52
Clinical . . . . .	57	1	...	1·89	4·0	0·07	...	0·13
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	41	3	...	7·31	2·9	0·21	...	0·52
Erysipelas . . . . .	...	...	...	0·07	..	...	...	0·00
Influenza . . . . .	214	...	...	4·45	15·1	...	...	0·32
Malaria . . . . .	2,475	...	...	48·32	175·1	...	...	3·42
Measles . . . . .	7	...	..	0·26	0·5	...	...	0·02
Meningococcal infection (Cerebro-spinal fever).	...	...	...	...	...	...	...	...
Mumps . . . . .	15	...	...	0·78	1·1	...	...	0·06
Plague . . . . .	...	...	...	...	...	...	...	...
Pneumonia . . . . .	120	13	..	9·13	8·5	0·92	...	0·50
Pyrexia of uncertain origin .	2	...	...	0·34	0·1	...	...	0·02
Rheumatic fever . . . . .	7	...	...	0·61	0·5	...	...	0·04

TABLE XVII—*concl.*

Diseases. Average Strength 57,912.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—concl.</i>								
Diseases due to disorders of nutrition or of metabolism.	10	...	3	1.04	0.2	...	0.04	0.02
Diseases of the— Generative system	111	...	2	6.98	1.8	...	0.03	0.11
Organs of locomotion	453	1	14	23.49	7.4	0.02	0.24	0.38
Areolar tissue	1,727	1	2	68.72	28.1	0.02	0.03	1.12
Skin diseases— Scabies	204	...	...	7.47	3.3	...	...	0.12
Other diseases	557	...	1	23.97	9.1	...	0.02	0.39
Diseases of the urinary system.	123	...	6	7.85	2.0	...	0.10	0.13
Injuries— General	14	5	...	0.25	0.2	0.09	...	0.00
Local	2,693	23	53	133.90	43.8	0.40	0.92	2.18
In action	...	3	...	...	...	0.04	...	...
Tumours and cysts	60	...	3	2.97	1.0	...	0.04	0.05
Malformations	4	...	2	0.14	0.1	...	0.03	0.00
Poisons	25	4	...	0.77	0.4	0.07	...	0.01
Parasites— Animal	350	...	2	22.91	5.7	...	0.03	0.37
Vegetable	1	...	...	0.11	0.0	...	...	0.00
No appreciable disease	18†	...	...	0.75	0.3	...	...	0.01
N. Y. D. (other causes)	...	...	...	...	...	...	...	...
Suicides*	...	(4)	...	...	...	(0.07)	...	...
TOTAL	26,453	165	354	930.32	430.3	2.85	6.11	15.14

\*The figures against "Suicides" having already been shown under the heading of th<sup>e</sup> injury, etc., which caused death, are not included in the totals.

†This includes 5 cases of diphtheria and cerebro-spinal fever carriers.

TABLE XVII—*contd.*

Diseases. Average Strength 57,912.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>								
Diseases of the—								
Eye . . . . .	636	...	25	28·83	11·0	...	0·43	0·50
Ear and nose . . .	753	1	12	20·48	13·0	0·02	0·21	0·35
Circulatory system—								
Valvular diseases of the heart.	2	...	2	0·21	0·0	...	0·03	0·00
Disordered action of the heart.	12	...	7	1·28	0·2	...	0·12	0·02
Other diseases . . .	28	2	3	1·56	0·5	0·03	0·04	0·03
Diseases of the—								
Blood . . . . .	46	2	1	3·09	0·7	0·03	0·02	0·05
Spleen . . . . .	10	...	...	0·32	0·2	...	...	0·01
Lymphatic system . .	71	3	5	5·23	1·2	0·04	0·09	0·09
Endocrine glands . .	9	...	...	0·36	0·2	...	...	0·01
Breast . . . . .	2	...	...	0·09	0·0	...	...	0·00
Respiratory diseases—								
Larynx and trachea . .	64	...	...	2·06	1·0	...	...	0·03
Bronchi and bronchioles	701	...	5	23·33	11·4	...	0·09	0·38
Lung (other than tuberculosis and pneumonia).	6	2	1	0·64	0·1	0·03	0·02	0·01
Other diseases . . .	114	2	8	10·82	1·9	0·03	0·14	0·18
Diseases of the—								
Teeth and gums . . .	128	...	5	3·46	2·1	...	0·09	0·06
Digestive system—								
Inflammation of tonsils .	379	...	...	8·13	6·2	...	...	0·13
Liver diseases . . .	252	2	2	13·69	4·1	0·03	0·03	0·22
Other diseases . . .	2,431	7	6	65·53	39·5	0·12	0·10	1·07

TABLE XVII—*contd.*

Diseases. Average Strength 57,912.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>								
Pneumonia . . . .	539	60	...	43·81	9·3	1·04	...	0·76
Pyrexia of uncertain origin.	8	1	...	0·98	0·1	0·02	...	0·02
Rheumatic fever . .	29	...	1	2·38	0·5	...	0·02	0·04
Sandfly-fever . . .	1,585	...	...	29·70	27·4	...	...	0·51
Scarlet fever . . . .	1	...	...	0·01	0·0	...	...	0·00
Small-pox . . . .	12	2	...	1·52	0·2	0·03	...	0·03
Tuberculosis—								
Pulmonary . . . .	121	6	120	11·54	2·1	0·10	2·07	0·20
Other . . . . .	25	1	10	3·23	0·4	0·02	0·17	0·06
Venereal diseases—								
Gonorrhœa . . . .	202	...	2	25·00	3·5	...	0·03	0·43
Soft chancre . . .	67	...	...	6·62	1·2	...	...	0·11
Syphilis . . . . .	160	1	4	17·75	2·8	0·02	0·07	0·31
Other v. d. . . . .	...	...	...	...	...	...	...	...
N. Y. D. venereal	...	...	...	...	...	...	...	...
Typhus fever . . . .	3	1	...	0·26	0·0	0·02	...	0·00
Other Diseases due to infection.	177	5	8	14·00	3·1	0·09	0·14	0·24
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system . . . . .	195	6	25	15·95	3·4	0·10	0·43	0·28
Mental diseases . . .	9	...	10	1·67	0·2	...	0·17	0·03



TABLE XVI—*concl'd.*

Diseases. Average Strength 121,018.	Admissions.	Deaths.	Invalids.	Average Number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids.	Constantly sick.
<i>Other diseases classified under systems--contd.</i>								
Digestive system—								
Inflammation of the tonsils . . . . .	744	...	...	17.23	6.1	...	...	0.14
Liver diseases . . . . .	528	6	6	24.85	4.4	0.05	0.05	0.25
Other diseases . . . . .	4,868	14	13	131.84	40.2	0.12	0.11	1.09
Diseases due to disorders of nutri- tion or of metabolism.	20	...	6	1.67	0.2	...	0.05	0.01
Diseases of the—								
Generative system . . . . .	328	...	2	16.87	2.7	...	0.02	0.14
Organs of locomotion . . . . .	1,027	1	39	52.31	8.5	0.01	0.32	0.43
Areolar tissue . . . . .	3,412	3	5	126.62	28.2	0.02	0.04	1.05
Skin diseases {	610	..	...	22.79	5.0	...	...	0.19
	1,246	...	9	54.07	10.3	...	0.07	0.45
Diseases of the urinary system . . . . .	237	5	10	15.33	2.0	0.04	0.08	0.13
Injuries {	19	8	...	0.41	0.2	0.07	...	0.00
	5,293	40	107	259.96	43.7	0.33	0.88	2.15
{ In action . . . . .	...	3	...	...	...	0.32	...	...
Tumours and cysts . . . . .	133	1	5	6.46	1.1	0.01	0.04	0.05
Malformations . . . . .	...	...	2	0.42	0.0	...	0.02	0.00
Poisons . . . . .	38	4	1	1.41	0.3	0.03	0.01	0.01
Animal parasites . . . . .	1,041	1	7	56.97	8.6	0.01	0.06	0.47
Vegetable Parasites . . . . .	1	...	...	0.11	0.0	...	...	0.00
No appreciable disease . . . . .	†66	...	1	2.05	0.5	...	0.01	0.02
N. Y. D. other causes . . . . .	4	...	...	0.03	0.0	...	...	0.00
Anti-rabic treatment . . . . .	...	...	...	...	...	...	...	...
Cause unknown . . . . .	...	...	...	...	...	...	...	...
Suicides* . . . . .	(1)	(7)	...	(0.11)	(0.0)	(0.06)	...	(0.00)
Total . . . . .	52,017	305	783	1 902.33	429.8	2.52	6.47	15.72

\* The figures against "Suicides" having already been shown under the heading of the injury etc., which caused death, are not included in the totals.

† This includes : cases of diphtheria, Enteric and Cerebro-spinal fever carriers.

TABLE XVI—*contd.*

Diseases. Average Strength 121,013.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.				
					Admissions.	Deaths.	Invalids.	Constantly sick.	
<i>Specific diseases due to infection—contd.</i>									
Tuberculosis { Pulmonary . . . . .	251	16	251	24·34	2·1	0·13	2·07	0·20	
Other . . . . .	42	3	25	6·34	0·3	0·02	0·21	0·05	
Venereal diseases. {	Gonorrhoea . . . . .	642	...	7	73·55	5·3	...	0·06	0·61
	Soft chancre . . . . .	222	...	...	22·33	1·8	...	...	0·18
	Syphilis . . . . .	444	1	7	45·51	3·7	0·01	0·06	0·38
	Other v. d. . . . .	2	...	1	0·28	0·0	...	0·01	0·00
(N. y. d. venereal . . . . .	4	...	...	0·10	0·0	...	...	0·00	
Typhus fever . . . . .	10	1	...	0·78	0·1	0·01	...	0·01	
Other diseases due to infection . . . . .	322	8	13	25·59	2·7	0·07	0·11	0·21	
<i>Other diseases classified under systems.</i>									
Diseases of the nervous system . . . . .	377	10	51	26·81	3·1	0·08	0·42	0·22	
Mental diseases . . . . .	26	1	21	3·06	0·2	0·01	0·17	0·03	
Diseases of the—									
Eye . . . . .	1,368	...	52	59·55	11·3	...	0·43	0·49	
Ear and nose . . . . .	1,326	2	31	36·93	11·0	0·02	0·26	0·31	
Circulatory System—									
Valvular diseases of the heart . . . . .	11	...	11	0·92	0·1	...	0·09	0·01	
Disordered action of the heart . . . . .	26	4	10	2·01	0·2	0·03	0·08	0·02	
Other diseases . . . . .	64	8	10	4·04	0·5	0·07	0·03	0·03	
Diseases of the blood . . . . .	141	2	6	11·88	1·2	0·02	0·05	0·09	
Diseases of the spleen . . . . .	21	...	...	1·16	0·2	...	...	0·01	
Diseases of the lymphatic system . . . . .	183	4	7	14·80	1·5	0·03	0·06	0·12	
Diseases of the endocrine glands . . . . .	18	...	2	0·68	0·1	...	0·02	0·01	
Diseases of the breast . . . . .	8	...	...	0·27	0·1	...	...	0·00	
Respiratory diseases. {	Larynx and trachea . . . . .	127	...	3·69	1·0	...	...	0·03	
	Bronchi and bronchioles. . . . .	1,675	2	55·96	18·8	0·02	0·20	0·46	
	Lung (other than tuberculosis and pneumonia). . . . .	9	2	1·13	0·1	0·02	0·02	0·01	
	Other diseases . . . . .	231	4	18	19·43	1·9	0·03	0·13	0·16
Diseases of the—									
Teeth and gums . . . . .	293	...	8	7·89	2·4	...	0·07	0·07	



## TABLE XVI.

INDIAN OFFICERS AND INDIAN OTHER RANKS.

ALL INDIA.

Table showing the average strength, admissions into hospital, deaths numbers invalided and constantly sick during the year 1932, with the ratios per 1,000 of Strength.

Diseases. Average Strength 121,013.	Admissions.	Deaths.	Invalids.	Average number constantly sick.	Ratio per 1,000.				
					Admissions.	Deaths.	Invalids.	Constantly sick.	
<i>Specific diseases due to infection.</i>									
Cholera . . . . .	4	2	...	0.22	0.0	0.02	...	0.00	
Dengue . . . . .	141	...	...	3.01	1.2	...	...	0.02	
Diphtheria . . . . .	8	...	...	0.55	0.1	...	...	0.00	
Dysentery	Bacillary . . . . .	827	2	2	31.64	6.8	0.02	0.02	0.26
	Bacillary exudate . . . . .	544	...	...	20.66	4.5	...	...	0.17
	Amoebic . . . . .	251	...	...	14.77	2.1	...	...	0.12
	Clinical . . . . .	398	1	...	14.39	3.3	0.01	...	0.12
Enteric fever (inclusive of typhoid, para. A, B and C, and enteric group).	256	17	...	38.01	2.1	0.14	...	0.31	
Erysipelas . . . . .	4	1	...	0.33	0.0	0.01	...	0.00	
Influenza . . . . .	1,241	1	...	27.08	10.3	0.01	...	0.22	
Malaria . . . . .	17,558	12	8	365.14	145.1	0.10	0.07	3.02	
Measles . . . . .	98	...	...	4.69	0.8	...	...	0.04	
Meningococcal infection (cerebro-spinal fever).	9	9	...	0.18	0.1	0.07	...	0.00	
Mumps . . . . .	289	...	...	17.16	2.4	...	...	0.14	
Plague . . . . .	6	5	...	0.19	0.0	0.04	...	0.00	
Pneumonia . . . . .	961	97	1	74.96	7.9	0.80	0.01	0.62	
Pyrexia of uncertain origin . . . . .	21	1	...	2.21	0.2	0.01	...	0.02	
Rheumatic fever . . . . .	64	...	2	5.38	0.5	...	0.02	0.04	
Sandfly fever . . . . .	1,850	...	...	34.56	15.3	...	...	0.29	
Scarlet fever . . . . .	1	...	...	0.01	0.0	...	...	0.00	
Small-pox . . . . .	22	3	...	2.26	0.2	0.02	...	0.02	

[illegible]

\* These heights are usually those of the survey-marks or of the mercury surface in barometer-cisterns of meteorological observatories.  
† S. D. = Survey Department (Map Publication Office).

†† S. D = Survey Department (Map Publication Office).

**S. G. — Surveyor-General of India.**

† S. B. M. = Standard Bench Mark.

† B. M. = G. T. Bench Mark.  
† Mon = Heights taken from

1. **செய்தியை மீட்டர் பாவனா கருவியாக அளிக்க**

by

STEEL

Site

Station

Height above M. S.  
Level in feet.

Authority for height.

Points of reference.

Height above M. S.  
Level in feet.

Authority for height.

Points of reference.

Height above M. S.  
Level in feet.

Authority for height.

Points of reference.

## NORTHERN COMMAND

Abbotabad	4,010	S. D.
Amritsar	902	"
Bahlo	754	"
Bannu	4,585	S. D.
Campbellpore	1,250	"
Chakrata	1,150	"
Cherat and Chappr	2,388	"
Chitral	4,546	"
Daghai	4,980	"
Daltonia	6,078	"
Dargi	7,687	"
Dera Ismail Khan	1,540	"
Diamarsala Cantt.	568	"
Ferozepore	4,500	"
Fort Jamrud (Hight er).	649	"
Lookhart	1,607	"
Hazuri	6,613	"
Jhelum	3,708	"
Jull	772	"
Jute	6,370	"

WESTERN COMMAND—  
*contd.*

Hyderabad (Sind)	96	S. D.
Karachi (Holy Trinity Church)	28	"
Loralai	4,699	"
Quetta	5,510	"
Eastern Command,		
Agra (fort)	525	S. D.
Alipore	17	"
Allahabad	314	"
Almorah	3,494	"
Bareilly	565	"
Banars	255	"
Cawnpore	407	"
Chakrata	6,385	"
Cumilla	"	"

SOUTHERN COMMAND—  
*contd.*

Deccan	1,894	S. D.
Jubbulpore	1,390	"
Kanpur (Ry. station).	940	"
Kitkee	1,885	"
Mhow (Ry. station)	1,887	"
Mount Abu (sanitor- ium).	3,866	"
Neemuch	1,613	"
Nasirabad	1,461	"
Pachmarhi	3,490	"
Poonah	1,867	"
Santa Cruz (Ry. sta- tion).	21	"
Savner	1,755	"
St. Thos. Mount (Ry. station).	34	"
Madras (Oby)	256	"
Trichinopoly	no avail	"
Tyngahery	no avail	"
Tritantrum	no avail	"
Wellington Stn. Hosp.	800	"

---

**SECTION II.**  
**INDIAN TROOPS, 1932.**



**TABLE XIV.**

VACCINATION PERFORMED IN THE FAMILIES—BRITISH ARMY DURING 1932.

Commands.	WOMEN.				CHILDREN.			
	Number.		Percentage of successful cases to total operations.		Number.		of successful cases to total operations.	
	Primary	Re-	Primary	Re-	Primary	Re-	Re-	Re-
Northern .	242	100	78	223	270	94	79	
Western .	95	100	88	72	61	85	92	
Eastern .	138	100	87	189	204	63	74	
Southern ..	164	100	80	204	307	81	86	
Burma District	10	32	100	81	35	16	91	62
TOTAL	30	666	100	78	723	858	81	81

**TABLE XV.**

VACCINATION PERFORMED IN THE FAMILIES—INDIAN ARMY DURING 1932.

Commands.	WOMEN.			CHILDREN.			
	Number.	Percentage of successful cases to total operations.		Number.	Percentage of successful cases to total operations.		
		Primary.	Re- vaccinat- ed.		Prim.	Re- vaccinat- ed.	av- erage.
Northern .	38	100	82	5	10	80	100
Western .	17	100	100	10	5	100	100
Eastern .	51		96	24	23	96	74
Southern ..	9		89	10	10	100	100
Burma District	2		50	...	1	...	100
TOTAL	117	100	91	49	49	96	



## XII.

## OTHER RANKS.

*contrasted with the previous year, and the average for the previous five years.*

Dysentery.		Pyrexia of uncertain origin.		Pneumonia. Lobar and Lobular.		Venereal diseases.		Dengue.		Sandfly fever.		Plague.	
Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
17.8	0.01	1.2	...	4.1	0.39	33.5	...	1.0	...	84.4	...	...	...
30.4	...	4.3	...	5.9	0.69	2.1	...	0.2	...	72.6	...	...	...
21.5	...	3.4	...	6.6	0.85	27.2	...	0.5	...	84.7	...	...	...
20.2	0.10	2.0	...	4.0	0.60	38.7	...	0.6	...	14.7	...	...	...
24.3	...	2.7	...	4.6	0.73	28.2	...	...	...	13.4	...	...	...
46.8	...	0.7	...	3.4	0.74	30.0	...	11.6	...	6.7	...	...	...
17.6	0.04	1.0	...	3.2	0.38	49.0	...	16.1	...	22.4	...	0.0	...
29.8	0.06	1.6	...	4.3	0.30	46.5	...	23.6	...	31.7	...	...	...
24.2	...	0.4	...	4.4	0.31	43.5	...	13.0	...	23.6	...	...	...
25.8	0.01	1.8	...	2.8	0.26	51.0	0.01	11.0	...	18.0	...	...	...
27.9	...	5.5	...	2.8	0.25	41.8	...	10.6	...	23.1	...	...	...
25.8	...	2.0	...	3.0	0.19	37.6	...	8.7	...	23.1	...	...	...
19.8	...	0.4	...	2.8	0.11	150.4	...	86.2	...	1.3	...	0.1	0.11
15.5	...	1.0	...	3.9	...	134.1	...	47.5	...	...	...	...	...
11.0	...	2.8	...	2.8	0.55	107.1	...	16.5	...	0.6	...	...	...
20.0	0.03	1.4	...	3.4	0.35	46.5	0.00	11.9	...	38.8	...	0.0	0.00
28.5	0.02	3.6	...	4.4	0.43	42.6	...	11.8	...	39.4	...	...	...
25.0	...	1.9	...	4.6	0.49	37.8	...	7.8	...	40.9	...	...	...



## TABLE

## BRITISH

*Table showing Admission and Death Ratios per 1,000 of Strength by Command*

Commands and years.		Enteric group of fevers.		Influenza.		Cholera.		Small-pox.		Malaria.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Northern mand.	Com-1927-31	5.0	0.38	16.2	...	0.0	0.01	0.1	...	171.7	0.12
	1931	4.7	0.46	36.5	...	...	...	0.1	...	140.2	...
	1932	4.8	0.28	29.3	...	...	...	0.2	...	91.7	0.17
Western mand.	Com-1927-31	4.2	0.15	12.9	0.05	...	...	0.1	...	165.1	0.30
	1931	5.6	...	13.1	0.49	...	...	0.5	...	140.8	0.24
	1932	3.7	0.25	44.1	...	...	...	...	...	131.1	0.49
Eastern mand.	Com-1927-31	3.5	0.29	10.8	...	0.1	0.02	0.0	...	81.1	0.10
	1931	2.8	0.18	22.9	...	...	...	0.1	...	112.5	0.06
	1932	2.9	0.25	11.7	...	...	...	...	...	89.5	0.06
Southern mand.	Com-1927-31	2.0	0.12	10.4	...	0.0	...	0.0	...	85.7	0.06
	1931	2.0	...	12.6	...	...	...	...	...	60.6	...
	1932	2.5	0.32	7.5	...	...	...	0.1	...	62.4	0.06
Burma District	1927-31	2.0	0.11	14.5	...	...	...	...	...	43.4	0.22
	1931	...	...	51.8	...	...	...	...	...	66.3	...
	1932	0.6	...	19.9	...	...	...	...	...	46.3	...
All-India	1927-31	3.5	0.26	12.5	0.00	0.00	0.01	0.1	...	96.9	0.12
	1931	3.3	0.20	24.5	...	...	...	0.1	...	112.5	0.04
	1932	3.4	0.27	18.8	0.04	...	...	0.1	...	84.1	0.13

TABLE XI—*conold.*

Diseases. Average Strength 6,684.	Admissions into Hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—conold.</i>						
Diseases of the skin—						
Scabies . . . . .	...	...	...	...	...	...
Other diseases . . . .	25	...	0.99	3.7	...	0.15
Urinary system . . . .	12	1	0.67	1.8	0.15	0.10
Injuries—						
General . . . . .	2	1	0.02	0.3	0.15	0.00
Local . . . . .	89	1	4.11	13.3	0.15	0.61
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . .	3	1	0.33	0.4	0.15	0.05
Malformations . . . .	7	3	0.27	1.0	0.45	0.04
Poisons . . . . .	2	1	0.02	0.3	0.15	0.00
Parasites—						
Animal . . . . .	25	...	0.47	3.7	...	0.07
No appreciable disease . .	25*	...	0.71	3.7	...	0.11
<i>Suicides</i> . . . . .	...	...	...	...	...	...
TOTAL . . . . .	1,999	85	65.61	299.1	12.72	9.82

\* Includes 5 admissions of Diphtheria Carrier.

TABLE XI—*contd.*

Diseases. Average Strength 6,684.	Admissions into Hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Blood . . . .	5	3	0·14	0·7	0·45	0·02
Spleen . . . .	1	...	0·08	0·1	...	0·01
Lymphatic system . .	22	...	0·83	3·3	...	0·12
Endocrine glands . .	...	...	...	...	...	...
Breast . . . .	1	...	0·06	0·1	...	0·01
Respiratory system—						
Larynx and trachea . .	11	...	0·32	1·6	...	0·05
Bronchi and bronchioles .	182	1	3·78	27·2	0·15	0·57
Lung (other than tuber- culosis and pneumonia).	1	1	0·00	0·1	0·15	0·00
Other diseases . . . .	1	...	0·03	0·1	...	0·00
Diseases of the—						
Teeth and gums . . . .	31	...	0·60	4·6	...	0·09
Digestive system—						
Inflammation of tonsils .	196	1	3·65	29·3	0·15	0·55
Liver diseases . . . .	18	...	0·87	2·7	...	0·13
Other diseases . . . .	433	16	10·33	64·8	2·39	1·55
Diseases due to disorders of nutrition or of metabolism.	31	7	1·37	4·6	1·05	0·20
Diseases of the—						
Generative system . . .	33	8	0·76	4·9	1·20	0·11
Organs of locomotion . .	9	1	0·21	1·3	0·15	0·03
Areolar tissue . . . .	88	...	2·51	13·2	...	0·38

TABLE XI—*contd.*

Diseases. Average Strength 6,684.	into Admissions Hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Sandfly fever . . . . .	13	...	0.19	1.9	...	0.03
Scarlet fever . . . . .	6	...	0.33	0.9	...	0.05
Small-pox . . . . .	1	...	0.05	0.1	...	0.01
Tuberculosis—						
Pulmonary . . . . .	1	...	0.06	0.1	...	0.01
Other . . . . .	4	...	0.21	0.6	...	0.03
Venereal diseases—						
Gonorrhœa . . . . .	5	...	0.44	0.7	...	0.07
Soft chancre . . . . .	...	...	...	...	...	...
Syphilis . . . . .	...	...	...	...	...	...
Other v. d. . . . .	...	...	...	...	...	...
Typhus fever . . . . .	...	...	...	...	...	...
Other diseases due to infection .	49	...	2.48	7.3	...	0.37
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system .	29	13	1.62	4.3	1.94	0.24
Mental diseases . . . . .	...	...	...	...	...	...
Diseases of the eye . . . . .	46	...	1.37	6.9	...	0.20
Diseases of the ear and nose . .	31	...	0.78	4.6	...	0.12
Circulatory system—						
Valvular diseases of the heart.	2	...	0.12	0.3	...	0.02
Disordered action of the heart.	...	...	...	...	...	...
Other diseases . . . . .	...	...	0.01	...	...	0.00

## TABLE XI.

CHILDREN OF WARRANT OFFICERS. N. C.Os. AND MEN.

## INDIA.

Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick during the year 1932 with the Ratios per 1,000 of the Strength.

Diseases. Average Strength 6,684.	Admissions into hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . . .	...	...	...	...	...	...
Dengue . . . . .	12	...	0·15	1·8	...	0·02
Diphtheria . . . . .	57	3	4·94	8·5	0·45	0·74
Dysentery—						
Bacillary . . . . .	58	2	2·93	8·7	0·30	0·44
Bacillary Exudate . . . . .	44	3	1·63	6·6	0·45	0·24
Amoebic . . . . .	5	...	0·15	0·7	...	0·02
Clinical . . . . .	32	3	1·17	4·8	0·45	0·18
Enteric fever (inclusive of typhoid para. A, B and enteric group).	26	1	3·02	3·9	0·15	0·45
Erysipelas . . . . .	3	...	0·05	0·4	...	0·01
Influenza . . . . .	21	...	0·33	3·1	...	0·05
Malaria . . . . .	161	2	3·83	24·1	0·30	0·57
Measles . . . . .	81	4	3·63	12·1	0·60	0·54
Meningococcal infection (cerebro-spinal fever).	...	...	...	...	...	...
Mumps . . . . .	1	...	0·10	0·1	...	0·01
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	45	8	2·03	6·7	1·20	0·30
Pyrexia of uncertain origin . . . . .	5	...	0·26	0·7	...	0·04
Rheumatic fever . . . . .	8	...	0·57	1·2	...	0·09

TABLE X—*conold.*

Diseases. Average Strength 4,317.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—conold.</i>						
Diseases of the—						
Generative system . . .	306	6	10.39	70.9	1.39	2.41
Organs of locomotion . . .	26	...	0.71	6.0	...	0.16
Areolar tissue . . .	41	...	1.13	9.5	...	0.28
Skin—						
Scabies . . . . .	...	...	...	...	...	...
Other diseases . . . . .	6	...	0.17	1.4	...	0.04
Urinary system . . . . .	48	...	2.68	11.1	...	0.62
Injuries—						
General . . . . .	1	...	0.02	0.2	...	0.00
Local . . . . .	27	1	0.85	6.3	0.23	0.20
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . . . .	13	1	0.89	3.0	0.23	0.21
Malformations . . . . .	...	...	...	...	...	...
Poisons . . . . .	4	...	0.09	0.9	...	0.02
Animal parasites . . . . .	4	...	0.17	0.9	...	0.04
Vegetable parasites . . . . .	...	...	...	...	...	...
No appreciable disease . . . . .	38	...	0.80	8.8	...	0.19
<i>Suicides</i> . . . . .	...	...	...	...	...	...
TOTAL . . . . .	1,262	18	41.62	292.3	4.17	9.64

TABLE X—*contd.*

Diseases. Average Strength 4,317.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Circulatory system—						
Valvular diseases of the heart.	10	1	0·56	2·3	0·23	0·13
Disordered action of the heart.	6	...	0·16	1·4	...	0·04
Other diseases . . . .	11	...	0·81	2·5	...	0·19
Diseases of the blood . . .	9	...	0·41	2·1	...	0·09
Diseases of the spleen . . .	1	...	0·12	0·2	...	0·03
Diseases of the lymphatic sys- tem.	2	...	0·13	0·5	...	0·03
Diseases of the endocrine glands.	2	...	0·03	0·5	...	0·01
Diseases of the breast . . .	11	...	0·34	2·5	...	0·08
Respiratory system—						
Larynx and trachea . . . .	3	...	0·03	0·7	...	0·01
Bronchi and bronchioles . .	56	...	1·54	13·0	...	0·36
Lung (other than tuber- culosis and pneumonia).	...	...	...	...	...	...
Other diseases . . . .	8	...	0·25	1·9	...	0·06
Diseases of the—						
Teeth and gums . . . .	7	...	0·11	1·6	...	0·03
Digestive system—						
Inflammation of tonsils . .	63	...	1·20	14·6	...	0·28
Liver diseases . . . .	3	...	0·20	0·7	...	0·05
Other diseases . . . .	236	...	7·17	54·7	...	1·66
Diseases due to disorders of nutrition or of metabolism.	3	...	0·11	0·7	...	0·03

TABLE X—*contd.*

Diseases. Average Strength 4,317.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Pyrexia of uncertain origin . . .	...	...	...	...	...	...
Rhenmatic fever . . . .	7	...	0·25	1·6	...	0·06
Sandfly fever . . . .	10	...	0·15	2·3	...	0·03
Scarlet fever . . . .	2	...	0·17	0·5	...	0·04
Small-pox . . . .	1	...	0·07	0·2	...	0·02
Tuberculosis—						
Pulmonary . . . .		1	0·10	1·2	0·73	0·02
Other . . . .	...	...	...	...	...	...
Venereal diseases—						
Gonorrhœa . . . .	1	...	0·03	0·2	...	0·01
Soft chancre . . . .	...	...	...	...	...	...
Syphilis . . . .	...	...	...	...	...	...
Other v. d. . . .	...	...	...	...	...	...
Typhus fever . . . .	...	...	...	...	...	...
Other diseases due to infection .	7	2	0·34	1·6	0·46	0·08
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system .	49	...	1·39	11·4	...	0·32
Mental diseases . . . .	1	...	0·32	0·2	...	0·07
Diseases of the eye . . . .	8	...	0·25	1·9	...	0·06
Diseases of the ear and nose .	15	...	0·40	3·5	...	0·09



TABLE X.

WIVES OF WARRANT OFFICERS, N. C. OS. AND MEN.

INDIA.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick during the year 1932, with the Ratios per 1,000 of the Strength.*

Diseases. Average Strength 4,317.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>	.	.	.	.	.	.
Cholera . . . . .	...	...	...	...	...	...
Dengue . . . . .	14	...	0.19	3.2	...	0.04
Diphtheria . . . . .	11	...	0.78	2.5	...	0.18
Dysentery—						
Bacillary . . . . .	16	...	0.80	3.7	...	0.19
„ Exudate . . . . .	8	...	0.43	1.9	...	0.10
Amoebic . . . . .	4	...	0.19	0.9	...	0.04
Clinical . . . . .	5	...	0.18	1.2	...	0.04
Enteric fever (inclusive of typhoid, para. A, B and enteric group).	11	4	1.01	2.5	0.93	0.23
Erysipelas . . . . .	...	...	...	...	...	...
Influenza . . . . .	25	...	0.45	5.8	...	0.10
Malaria . . . . .	106	1	2.53	24.6	0.23	0.59
Measles . . . . .	1	...	0.04	0.2	...	0.01
Meningococcal infection (cere- bro-spinal fever).	...	...	...	...	...	...
Mumps . . . . .	1	...	0.02	0.2	...	0.00
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	9	1	0.46	2.1	0.23	0.11

TABLE IX—*concl'd.*

Diseases. Average Strength, 2,295.	Admissions into Hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Generative system . . .	1	...	0·03	0·4	...	0·01
Organs of locomotion . .	37	...	1·32	16·1	...	0·58
Areolar tissue . . .	98	...	2·74	42·7	...	1·19
Skin—						
Scabies . . . . .	...	...	...	...	...	...
Other diseases . . . .	13	...	0·34	5·7	...	0·15
Urinary system . . . .	15	1	0·83	6·5	0·44	0·36
Injuries—						
General . . . . .	10	...	0·21	4·4	..	0·09
Local . . . . .	140	3	5·60	61·0	1·31	2·44
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . .	5	...	0·40	2·2	...	0·17
Malformations . . . .	...	...	...	...	...	...
Poisons . . . . .	2	...	0·33	0·9	...	0·14
Parasites—						
Animal . . . . .	6	...	0·06	2·6	...	0·03
Vegetable . . . . .	...	...	...	...	...	...
No appreciable disease .	2	...	0·01	0·9	...	0·00
<i>Suicides *</i> . . . . .	...	(1)	...	...	(0·44)	...
TOTAL . . . . .	1,063	15	33·75	463·2	6·54	16·88

\*The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the total.

TABLE IX—*contd.*

Diseases. Average strength, 2,295.	Admissions into Hospital.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
<i>Circulatory system—contd.</i>						
Disordered action of the heart.	3	...	0.12	1.3	...	0.05
Other diseases . . . .	5	1	0.21	2.2	0.44	0.09
<i>Diseases of the—</i>						
Blood . . . . .	1	...	0.10	0.4	...	0.04
Spleen . . . . .	...	...	...	...	...	...
Lymphatic system . . .	7	...	0.27	3.1	...	0.12
Endocrine glands . . .	...	...	...	...	...	...
<i>Diseases of the—</i>						
Breast . . . . .	1	...	0.04	0.4	...	0.02
<i>Respiratory system—</i>						
Larynx and trachea . .	4	...	0.08	1.7	...	0.03
Bronchi and bronchioles .	23	...	0.58	10.0	...	0.25
Lung (other than tubercu- losis and pneumonia).	...	...	...	...	...	...
Other diseases . . . .	6	...	0.47	2.6	...	0.20
Teeth and gums . . . .	7	...	0.16	3.1	...	0.07
<i>Digestive system—</i>						
Inflammation of tonsils .	50	...	1.15	21.8	...	0.50
Liver diseases . . . .	74	1	3.85	32.2	0.44	1.68
Other diseases . . . .	163	1	5.55	71.0	0.44	2.42
<i>Diseases due to disorders of nutrition or of metabolism.</i>	2	...	0.10	0.9	...	0.04

TABLE IX—*contd.*

Diseases. Average strength, 2,295.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Pyrexia of uncertain origin . . . . .	3	...	0·30	1·3	...	0·13
Rheumatic fever . . . . .	3	...	0·16	1·3	...	0·07
Sandfly fever . . . . .	66	...	1·08	28·8	...	0·47
Scarlet fever . . . . .	1	...	0·11	0·4	...	0·05
Small-pox . . . . .	2	...	0·13	0·9	...	0·06
Tuberculosis—						
Pulmonary . . . . .	3	...	0·45	1·3	...	0·20
Other . . . . .	...	...	...	...	...	...
Venereal diseases—						
Gonorrhœa . . . . .	1	...	0·07	0·4	...	0·03
Soft chancre . . . . .	...	...	...	...	...	...
Syphilis . . . . .	...	...	...	...	...	...
Other venereal diseases . . . . .	...	...	...	...	...	...
Typhus fever . . . . .	...	...	...	...	...	...
Other diseases due to infection . . . . .	11	1	1·02	4·8	0·44	0·44
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system . . . . .	33	2	1·44	14·4	0·87	0·63
Mental diseases . . . . .	...	...	...	...	...	...
Diseases of the—						
Eye . . . . .	5	...	0·11	2·2	...	0·05
Ear and nose . . . . .	28	...	0·59	12·2	...	0·26
Circulatory system—						
Valvular diseases of the heart.	2	1	0·09	0·9	0·44	0·04

## TABLE IX.

BRITISH OFFICERS. (BRITISH SERVICES.)

Table showing the Average strength, Admissions into hospital, Deaths and Constantly sick, during the year 1932 with the Ratios per 1,000 of the strength.

Diseases. Average strength, 2,295.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . . .	...	...	...	...	...	...
Dengue . . . . .	10	...	0·18	4·4	...	0·08
Diphtheria . . . . .	5	...	0·33	2·2	...	0·14
Dysentery—						
Bacillary . . . . .	23	...	1·00	10·0	...	0·44
Bacillary Exudate . . . . .	14	...	0·40	6·1	...	0·17
Amoebic . . . . .	16	...	0·95	7·0	...	0·41
Clinical . . . . .	12	...	0·42	5·2	...	0·18
Enteric fever (inclusive of typhoid, para. A, B and enteric group).	11	3	1·63	4·8	1·31	0·71
Erysipelas . . . . .	2	...	0·04	0·9	...	0·02
Influenza . . . . .	29	...	0·59	12·6	...	0·26
Malaria . . . . .	95	...	2·26	41·4	...	0·98
Measles . . . . .	2	...	0·08	0·9	...	0·03
Meningococcal infection (cerebro- spinal fever)	...	...	...	...	...	...
Mumps . . . . .	...	...	0·03	...	...	...
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	11	1	0·74	4·8	0·44	0·32

## VIII—concl'd.

Diarrhea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandy Fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular.)	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
11.5	...	20.3	...	186.3	...	33.2	...	8.1	4.1	...	...	585.1	21.20
...	...	38.5	...	38.5	...	...	...	...	...	...	...	384.6	9.62
22.3	...	23.7	...	16.6	...	27.6	...	13.1	3.9	...	...	509.9	19.92
14.5	...	29.0	...	101.4	29.0	...	...	29.0	7.2	...	...	550.7	11.16
6.9	...	38.0	...	73.7	39.2	1.2	...	54.1	6.9	...	...	640.8	25.53
7.2	...	26.4	...	144.2	...	...	...	...	7.2	...	2.4	632.2	33.53
12.2	...	26.3	...	104.0	10.3	19.3	...	19.8	5.2	...	0.3	587.4	22.69
...	...	28.2	14.1	70.4	...	...	...	14.1	...	...	...	338.0	4.79
11.0	...	30.8	...	56.4	...	35.9	...	0.4	2.0	...	0.4	532.5	36.51
...	...	...	...	53.1	...	...	...	61.9	...	...	...	672.6	50.88
10.3	...	29.4	...	56.6	...	33.5	...	3.3	1.8	...	0.4	533.3	36.23
10.1	...	50.6	...	11.6	21.0	...	...	...	0.7	...	...	425.6	25.09
5.1	...	105.7	...	38.2	80.3	1.3	...	17.8	2.5	...	...	626.8	34.60
13.0	...	39.0	...	30.3	...	...	...	...	...	...	...	402.6	17.23
7.3	...	23.0	...	42.3	...	...	...	...	2.4	...	...	357.9	19.31
8.4	...	56.1	...	27.3	28.5	0.3	...	4.3	1.5	...	...	455.5	25.36
23.7	...	171.6	...	23.7	29.6	...	...	5.9	...	...	...	775.1	35.44
11.8	...	104.9	...	64.3	1.7	1.7	...	40.6	...	...	...	615.9	43.45
26.7	...	226.7	...	13.3	...	...	...	...	...	...	...	733.3	12.80
4.7	...	82.6	...	32.6	23.3	...	...	2.3	5.8	...	...	493.0	29.28
...	...	16.9	...	101.7	25.4	...	...	76.3	...	...	...	601.7	24.99
9.4	...	99.8	...	45.8	16.0	0.6	...	19.9	2.8	...	...	576.4	33.51
12.7	...	36.1	0.1	82.3	7.4	40.1	...	18.3	4.0	0.9	3.1	577.0	26.26

TABLE

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid Fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary Bact.	Bacillary Exudate.	Protozoal.	Clinical.	
Mhow . . . .	1,475	0·7	...	..	...	6·1	14·9	4·7	0·7	3·4	...
Mt. Abu . . . .	26	...	...	...	...	...	...	...	...	...	...
Nasirabad . . . .	760	...	1·3	...	...	...	19·7	10·5	1·3	3·9	...
Ahmedabad . . . .	138	...	...	...	...	...	14·5	...	...	...	...
Colaba . . . .	868	1·2	...	...	...	3·5	4·6	3·5	2·3	1·2	...
Deolali . . . .	416	2·4	...	...	...	...	...	4·8	...	4·8	...
Bombay District	3,684	0·5	0·3	..	...	3·3	11·7	5·4	1·1	3·0	...
Belgaum . . . .	71	...	...	...	...	...	...	..	...	...	...
Poona . . . .	2,535	...	...	0·4	...	0·8	8·7	13·8	3·5	3·9	...
Purandhar . . . .	113	...	...	...	...	...	...	...	...	...	...
Poona Brigade Area.	2,719	...	...	0·4	...	0·7	8·1	12·9	3·3	3·7	...
Bangalore . . . .	1,384	..	0·7	...	...	0·7	10·1	7·2	0·7	...	...
Madras . . . .	785	...	...	...	...	5·1	...	3·8	2·5	...	1·3
Malapuram . . . .	231	...	...	...	...	...	...	13·0	4·3	...	...
Wellington . . . .	827	...	...	...	...	...	2·4	...	4·8	...	...
Madras District	3,227	...	0·8	...	...	1·5	5·0	5·0	2·5	...	0·3
Mandalay . . . .	169	...	...	...	...	...	...	...	...	...	...
Maymyo . . . .	591	...	...	...	...	...	3·4	3·4	3·4	...	...
Meiktila . . . .	75	...	...	...	...	...	...	...	...	...	...
Mingaladon . . . .	860	...	...	...	...	1·2	10·5	1·2	1·2	2·3	...
Port Blair . . . .	118	...	...	...	...	...	...	...	...	...	16·9
Burma District	1,813	...	...	...	...	0·6	6·1	1·7	1·7	1·1	1·1
INDIA . . . .	55,338	1·1	0·4	0·0	...	1·9	8·5	6·6	3·6	5·1	0·4

VIII—*contd.*

Diarrhoea.	Cholera.	Venereal Diseases.	Small-pox.	Malaria.	Dengue.	Sandy Fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular).	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
10.9	...	9.5	...	16.3	4.1	38.0	...	1.4	5.4	4.1	...	364.1	14.08
...	...	...	...	...	...	...	...	...	...	...	...	...	...
8.8	...	44.0	...	14.1	0.9	30.8	...	11.9	1.8	5.7	0.9	445.3	20.52
12.1	...	42.0	...	56.4	2.5	30.6	...	10.2	2.7	2.5	6.9	523.4	21.99
16.6	...	59.3	...	52.0	148.6	...	...	54.1	1.0	...	...	673.6	23.79
14.8	...	109.3	...	83.3	44.4	...	...	...	...	...	...	644.4	39.57
...	...	36.8	...	17.5	...	73.6	...	10.5	7.0	1.8	10.5	397.5	15.97
5.9	...	49.4	...	13.8	...	...	...	35.6	2.0	...	...	436.8	17.41
...	...	15.6	...	350.0	...	...	...	...	...	...	...	577.3	11.83
9.8	...	63.3	...	63.3	60.4	15.2	...	27.5	2.2	0.4	2.2	560.3	23.25
22.2	...	41.9	...	310.3	...	...	...	13.5	2.5	...	27.1	702.0	25.04
15.6	...	52.3	...	198.3	0.9	24.8	...	7.3	14.7	1.8	10.1	736.5	27.76
8.5	...	89.7	...	307.7	...	21.4	...	8.5	4.3	...	12.8	760.7	29.74
17.3	...	52.3	...	252.3	0.5	15.0	...	9.8	8.9	0.9	16.8	724.3	26.88
13.8	...	18.1	...	129.6	...	23.4	...	...	...	...	...	654.6	18.84
12.1	...	37.0	...	76.0	...	10.2	...	...	1.3	0.6	0.6	493.6	22.20
57.6	...	19.6	...	24.9	...	22.3	...	6.5	1.3	...	3.9	523.6	16.15
11.9	...	43.1	...	26.1	0.7	47.4	...	3.3	1.8	0.4	...	562.3	29.07
...	...	30.3	...	121.2	...	...	...	...	...	...	...	323.3	9.85
43.5	...	...	...	43.5	...	87.0	...	...	...	...	...	913.0	12.61
18.0	...	34.5	...	55.7	0.3	30.7	...	2.3	1.3	0.3	0.7	55.5	24.11



TABLE

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.					Dysentery.				Colitis.
		Typhoid Fever.	Para. A. J.	Para. B.	Para. C.	Enteric Group.	Bacillary Bact.	Bacillary Exudate.	Protozoal.	Clinical.	
Fyzabad . . .	736	1.4	2.7	...	...	6.8	...	...	2.7	4.1	...
Sitapur . . .	5	...	...	...	...	...	...	...	...	...	...
Lucknow . . .	2,275	1.8	0.4	...	...	0.9	6.2	7.9	2.6	0.9	0.4
<i>Lucknow Dist.</i> . .	4,807	1.5	0.6	...	...	1.9	5.0	4.8	2.5	6.2	0.2
Calcutta . . .	962	...	...	...	...	1.0	3.1	5.2	6.2	3.1	...
Barrackpore . . .	540	...	...	...	...	...	5.6	11.1	7.4	...	13.0
Dinapore . . .	571	...	...	...	...	1.8	...	...	1.8	1.8	...
Lebong . . .	506	...	...	...	...	...	...	2.0	2.0	7.9	...
Dacca . . .	180	...	...	...	...	...	...	...	...	11.1	...
<i>Presidency and Assam District.</i> . .	2,763	...	...	...	...	0.7	2.2	4.3	4.3	3.6	2.5
Agra . . .	812	...	...	...	...	1.2	6.2	7.4	2.5	24.6	...
Delhi . . .	1,089	...	...	...	...	...	2.8	4.6	2.8	4.6	...
Muttra . . .	234	...	...	...	...	4.3	8.5	8.5	...	5.6	...
<i>Delhi (Ind.) Brigade Area.</i> . . .	2,140	...	...	...	...	0.9	4.7	6.1	2.3	14.5	...
Ahmednagar . . .	941	2.1	1.1	...	...	...	...	4.3	6.4	1.1	...
Jubbulpore . . .	1,566	0.6	...	...	...	...	10.2	5.7	3.8	5.7	...
Kamptee . . .	764	...	...	...	...	2.6	1.3	7.9	...	3.9	...
Secunderabad . . .	2,762	1.8	0.4	...	...	0.4	14.1	22.1	3.3	10.5	0.4
Pachmarhi . . .	66	...	...	...	...	...	...	...	...	...	...
Saugor . . .	23	...	...	...	...	...	...	...	...	...	...
<i>Deccan District</i> . .	6,122	1.3	0.3	...	...	0.5	9.1	13.1	3.4	6.9	0.2



[illegible]

VIII—*contd.*[illegible]

TABLE

[illegible]

## VIII.

## OTHER RANKS.

*and constantly sick for all causes in each station and district in India 1932.*

Diarrhoea.	Cholera.	Veneral Diseases.	Small-pox.	Malaria.	Dengue.	Sandy fever.	Plague.	Influenza.	Pneumonia (Lobar and Lobular.)	Heat-stroke.	Heat-exhaustion.	All Causes.	Average annual number constantly sick.
9.6	...	4.8	...	47.8	...	12.0	...	4.8	2.4	...	...	380.4	11.08
...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...
6.1	...	25.7	...	102.8	...	588.0	...	144.4	17.1	...	...	1296.2	34.04
...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...
7.3	...	18.3	...	90.8	...	137.6	...	45.0	5.5	0.9	1.8	778.9	29.64
11.2	...	26.0	...	115.2	...	258.7	...	40.9	2.2	0.7	3.7	767.3	31.56
9.6	...	17.8	...	39.7	...	58.8	...	8.2	4.1	1.4	8.2	589.6	18.99
...	...	...	...	...	...	...	...	...	...	...	...	200.0	2.00
8.8	...	20.5	...	87.9	...	280.9	...	51.9	6.1	0.7	2.9	799.8	27.32
...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...
20.7	...	13.8	...	303.4	...	165.5	...	...	...	...	...	951.7	23.72
...	...	...	...	166.7	...	...	...	...	...	...	...	165.7	3.33
19.9	...	13.2	...	298.0	...	158.9	...	...	...	...	...	920.5	22.91
4.0	...	23.8	...	188.9	...	...	...	27.8	15.9	...	...	579.4	16.47
38.1	...	25.4	...	110.2	...	29.7	...	...	8.5	...	...	656.8	49.03
24.5	...	18.4	6.1	208.6	...	46.1	...	6.1	6.1	...	...	791.4	21.41
8.4	...	5.6	...	86.2	...	...	...	11.1	...	...	...	406.7	9.92
107.8	...	68.6	...	68.6	...	...	...	29.4	19.6	...	...	950.4	9.61
23.0	...	23.0	...	84.5	...	...	...	...	...	...	...	456.8	14.94

march, but details are exclusive of them.

## TABLE

## BRITISH

Table showing ratios per 1,000 of strength of admissions for certain diseases during

Stations and Districts.	Average Annual Strength.	Enteric Group of Fevers.				Dysentery.				Colitis.	
		Typhoid Fever.	Para. A.	Para. B.	Para. C.	Enteric Group.	Bacillary Bact.	Bacillary Exudate.	Protozoal.		Clinical.
Cherat . . . . .	418	...	..	...	...	2.4	2.4	..	...	...	...
Dargai . . . . .	4	...	...	...	...	...	...	...	...	...	...
Drosh . . . . .	10	...	...	...	...	...	..	...	...	...	...
Jamrud . . . . .	3	...	...	...	...	...	...	...	...	...	...
Landi Kotal . . . . .	817	...	...	...	...	3.7	15.9	22.0	...	...	...
Malakand . . . . .	...	...	...	...	...	...	...	...	...	...	...
Mardan . . . . .	1	...	...	...	...	...	...	...	...	...	...
Nowshera . . . . .	1,090	...	...	...	...	7.3	10.1	1.8	0.9	4.6	...
Peshawar . . . . .	1,345	0.7	...	...	...	0.7	25.3	6.7	..	5.9	0.7
Bisalpur . . . . .	731	...	...	...	...	2.7	21.9	10.9	...	17.8	...
Chakdara . . . . .	5	...	...	...	...	...	...	...	...	...	...
<i>Peshawar Dist.</i>	4,435	0.2	...	...	...	3.4	16.9	8.3	0.2	5.9	0.2
Fort Lockhart . . . . .	...	...	...	...	...	...	...	...	...	...	...
Hangu . . . . .	...	...	...	...	...	...	...	...	...	...	...
Kohat . . . . .	145	...	...	...	...	...	6.9	...	6.9	...	...
Thal . . . . .	6	...	...	...	...	...	...	...	...	...	...
<i>Kohat Dist.</i>	151	...	...	...	...	...	6.6	...	6.6	...	...
Abbottabad . . . . .	252	...	11.9	...	...	4.0	4.0	7.9	...	7.9	...
Barian . . . . .	236	...	...	...	...	...	4.2	...	...	...	...
Campbellpore . . . . .	163	...	...	...	...	...	...	...	...	...	...
Ghariai . . . . .	359	...	...	...	...	...	...	...	...	...	...
Jhelum . . . . .	102	...	9.8	...	...	29.4	...	...	...	...	...
Kalabagh (Hazara)	87	...	...	...	...	11.5	46.0	...	...	11.5	...

NOTE.—The totals of districts are inclusive of particulars in respect of troops on the line of

TABLE VII.

## BRITISH OTHER RANKS.

Table showing monthly ratios per 1,000 of strength of admissions for certain diseases for all-India, during the year 1932.

Months.	Bacterial group of fevers.	Influenza.	Cholera.	Small-pox.	Malaria.	Dysentery Protozoal.	Dysentery Bacillary.	Dysentery Bacillary Exudate.	Dysentery Group.	Pyrexia of Uncertain Origin.	Pneumonia (Lobar and Lobular).	Diarrhoea.	Dengue.	Sandy fever.	Plague.	Colitis.	Effects of Heat.	All causes.
January 1932	0.4	4.7	...	...	2.8	0.2	0.5	0.2	0.2	0.0	0.4	0.7	0.7	0.5	...	0.0	...	43.0
February "	0.2	1.3	...	...	2.0	0.1	0.4	0.2	0.3	0.2	0.2	0.7	0.1	0.4	...	0.0	...	33.8
March "	0.4	1.0	...	...	2.2	0.1	0.6	0.5	0.3	0.3	0.4	1.0	0.4	0.8	...	...	...	27.4
April "	0.4	0.9	...	...	2.8	0.3	1.3	0.5	0.5	0.3	0.3	1.2	0.3	3.8	...	...	...	48.6
May "	0.4	0.6	...	...	4.7	0.1	0.9	0.2	0.3	0.1	0.2	1.2	0.2	4.2	...	...	0.2	55.1
June "	0.2	0.9	...	...	5.8	0.3	0.5	0.4	0.2	0.2	0.3	0.7	0.4	6.8	...	0.1	3.3	55.1
July "	0.2	0.9	...	...	7.7	0.2	0.6	0.8	0.5	0.1	0.4	1.1	0.3	7.6	...	0.1	0.4	55.4
August "	0.4	0.3	...	...	9.5	0.7	1.3	1.5	1.0	...	0.1	1.8	1.0	7.7	...	0.9	...	58.1
September "	0.4	0.3	...	...	13.5	0.7	0.8	0.8	0.4	0.0	0.3	1.2	1.5	4.1	...	0.0	...	64.4
October "	0.2	0.6	...	...	11.9	0.4	0.4	0.5	0.6	0.0	0.0	0.9	1.3	3.0	...	0.0	...	51.7
November "	0.3	0.8	...	...	13.8	0.4	0.4	0.6	0.6	0.0	0.5	1.1	0.9	0.8	...	...	...	53.4
December "	0.1	6.1	...	0.0	5.6	0.1	0.6	0.4	0.5	0.1	0.6	1.1	0.3	0.2	...	...	...	44.2
TOTAL	3.5	18.3	...	0.1	82.3	3.6	8.5	6.6	5.1	1.4	4.0	12.7	7.4	49.1	...	0.4	4.0	577.0



TABLE VI—*concl'd.*

Diseases. Average Strength 1,813.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Skin—						
Scabies . . . . .	8	...	0·25	4·4	...	0·14
Other diseases . . . .	34	...	1·71	18·8	...	0·94
Urinary system . . . .	3	...	0·11	1·7	...	0·06
Injuries—						
General . . . . .	...	...	...	...	...	...
Local . . . . .	74	1	3·04	40·8	0·55	1·68
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . .	5	...	0·22	2·8	...	0·12
Malformations	...	...	...	...	...	...
Poisons . . . . .	25	...	0·27	13·8	...	0·15
Animal parasites . . . .	3	...	0·07	1·7	...	0·04
No appreciable disease*	5	...	0·22	2·8	...	0·12
Suicides† . . . . .	(1)	(1)	(0·04)	(0·6)	(0·55)	(0·02)
<b>TOTAL .</b>	<b>1,051</b>	<b>2</b>	<b>61·05</b>	<b>579·7</b>	<b>1·10</b>	<b>33·67</b>

\* Includes one admission of Diptheria Carrier.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the totals.

TABLE VI—*contd.*

Diseases. Average Strength 1,813.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Blood . . . . .	...	...	...	...	...	...
Spleen . . . . .	...	...	...	...	...	...
Lymphatic system . . .	21	...	1.68	11.6	...	0.93
Endocrine glands . . .	...	...	...	...	...	...
Breast . . . . .	...	...	...	...	...	...
Respiratory system—						
Larynx and trachea . . .	2	...	0.03	1.1	...	0.02
Bronchi and bronchioles .	26	...	0.90	14.3	...	0.50
Lung (other than tubercu- losis and pneumonia).	...	...	...	...	...	...
Other diseases . . . . .	1	...	0.07	0.6	...	0.04
Teeth and gums . . . . .	7	...	0.13	3.9	...	0.07
Digestive system—						
Inflammation of tonsils .	67	...	2.17	37.0	...	1.20
Liver diseases . . . . .	13	...	0.97	7.2	...	0.53
Other diseases . . . . .	81	...	2.84	44.7	...	1.57
Diseases due to disorders of nutrition or of metabolism.	2	...	0.17	1.1	...	0.09
Diseases of the—						
Generative system . . . .	31	...	1.54	17.1	...	0.85
Organs of locomotion . . .	41	...	1.90	22.6	...	1.05
Areolar tissue . . . . .	172	...	8.71	94.9	...	4.80

TABLE VI—*contd.*

Diseases. Average Strength 1,813.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Scarlet fever . . . .						
Small-pox . . . .						
Tuberculosis—						
Pulmonary . . . .						
Other . . . .						
Venereal diseases—						
Gonorrhœa . . . .	116		17·20	64·0		9·49
Soft chancre . . . .	40		3·18	22·1		1·75
Syphilis . . . .	38		4·34	21·0		2·39
Other v. d. . . .						
Typhus fever . . . .						
Other diseases due to infection .						
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system	21		1·28	11·6		0·71
Mental diseases . . . .	1		0·14	0·6		0·08
Diseases of the—						
Eye . . . .	6		0·23	3·3		0·13
Ear and nose . . . .	18		0·82	9·9		0·45
Circulatory system—						
Valvular diseases of the heart.						
Disordered action of the heart.			0·01	0·6		0·00
Other diseases . . . .						

TABLE VI.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

## BURMA DISTRICT.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly sick during the year 1932 with the Ratios per 1,000 of the Strength.*

Diseases. Average strength 1,813.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . . .	..	...	...	...	...	...
Dengue . . . . .	30	...	0.80	16.5	...	0.44
Diphtheria . . . . .	4	...	0.37	2.2	...	0.20
Dysentery—						
Bacillary . . . . .	13	...	0.53	7.2	...	0.2
Bacillary Exudate . . . . .	2	...	0.14	1.1	...	0.08
Amoebic . . . . .	3	...	0.24	1.7	...	0.13
Clinical . . . . .	2	...	0.07	1.1	...	0.04
Enteric fever (inclusive of typhoid, para. A, B and enteric group).	1	...	0.18	0.6	...	0.16
Erysipelas . . . . .	...	...	...	...	...	...
Influenza . . . . .	36	...	0.71	19.9	...	0.39
Malaria . . . . .	84	...	2.65	46.3	...	1.46
Measles . . . . .	1	...	0.03	0.6	...	0.02
Meningococcal infection (cerebro- spinal fever).	...	...	...	...	...	...
Mumps . . . . .	...	...	...	...	...	...
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	5	1	0.49	2.8	0.55	0.27
Pyrexia of uncertain origin . . . . .	5	...	0.23	2.8	...	0.13
Rheumatic fever . . . . .	2	...	0.39	1.1	...	0.21
Sandfly fever . . . . .	1	...	0.02	0.6	...	0.01

TABLE V—*concl'd.*

Diseases. Average strength 15,752.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Skin—						
Scabies . . . . .	26	...	0·87	1·7	...	0·06
Other diseases . . . .	329	...	17·98	20·9	...	1·14
Urinary system . . . .	80	1	5·55	5·1	0·06	0·35
Injuries—						
General . . . . .	12	6	0·24	0·8	0·38	0·02
Local . . . . .	1,019	5	43·51	64·7	0·32	2·76
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . .	48	...	3·03	3·0	...	0·19
Malformations . . . .	4	...	0·33	0·3	...	0·02
Poisons . . . . .	12	...	0·24	0·8	...	0·02
Animal parasites . . . .	101	...	2·24	6·4	...	0·14
No appreciable disease*	53	...	1·66	3·4	...	0·11
Suicides† . . . . .	(1)	(2)	(0·03)	(0·1)	(0·13)	(0·00)
TOTAL . . . . .	8,588	34	411·51	545·2	2·16	26·12

\* Includes 3 admissions for Diphtheria and Dysentery Carriers.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the totals.

TABLE V—*contd.*

Diseases. Average strength 15,752.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Blood . . . . .	9	...	0.70	0.6	...	0.04
Spleen . . . . .	2	1	0.07	0.1	0.06	0.00
Lymphatic system . . .	107	1	7.92	6.8	0.06	0.50
Endocrine glands . . .	...	...	0.02	...	...	0.00
Breast . . . . .	1	...	0.03	0.1	...	0.00
Respiratory system—						
Larynx and trachea . . .	15	...	0.33	1.0	...	0.02
Bronchi and bronchioles .	283	...	9.33	18.0	...	0.59
Lung (other than tubercu- losis and pneumonia).	2	...	0.03	0.1	...	0.00
Other diseases . . . . .	22	...	1.25	1.4	...	0.08
Teeth and gums . . . . .	30	...	0.89	1.9	...	0.06
Digestive system—						
Inflammation of tonsils .	512	...	12.07	32.5	...	0.77
Liver diseases . . . . .	171	3	10.30	10.9	0.19	0.35
Other diseases . . . . .	970	4	36.78	61.6	0.25	2.33
Diseases due to disorders of nutrition or of metabolism.	2	...	0.21	0.1	...	0.01
Diseases of the—						
Generative system . . . .	260	...	13.18	16.5	...	0.84
Organs of locomotion . . .	302	...	16.59	19.2	...	1.05
Areolar tissue . . . . .	741	...	28.07	47.0	...	1.66

TABLE V—*contd.*

Diseases. Average strength 15,752.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Sandfly fever . . . . .	364	...	8.74	23.1	...	0.55
Scarlet fever . . . . .	1	...	0.1	0.1	...	0.01
Small-pox . . . . .	1	...	0.07	0.1	...	0.00
Tuberculosis—						
Pulmonary . . . . .	17	...	4.65	1.1	...	0.30
Other . . . . .	2	...	0.28	0.1	...	0.02
Veneral diseases—						
Gonorrhoea . . . . .	426	...	61.82	27.0	...	3.92
Soft chancre . . . . .	82	...	9.95	5.2	...	0.63
Syphilis . . . . .	83	...	7.81	5.3	...	0.50
Other v. d. . . . .	1	...	0.03	0.1	...	0.00
Typhus fever . . . . .	6	...	0.46	0.4	...	0.03
Other diseases due to infection .	6	1	0.27	0.4	0.06	0.02
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system .	181	1	9.90	11.5	0.06	0.63
Mental diseases . . . . .	26	...	7.21	1.6	...	0.46
Diseases of the—						
Eye . . . . .	56	...	2.61	3.6	...	0.17
Ear and nose . . . . .	317	...	11.13	20.1	...	0.71
Circulatory system—						
Valvular diseases of the heart. . . . .	8	1	0.94	0.5	0.06	0.06
Disordered action of the heart. . . . .	51	...	2.83	3.2	...	0.18
Other diseases . . . . .	23	1	1.39	1.5	0.06	0.09

TABLE V.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

## SOUTHERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly sick during the year 1932 with the Ratios per 1,000 of the Strength.*

Diseases. Average Strength 15,752.	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . .	...	...	...	...	...	...
Dengue . . . .	137	...	3.15	8.7	...	0.20
Diphtheria . . . .	31	...	2.90	2.0	...	0.18
Dysentery—						
Bacillary . . . .	140	...	6.28	8.9	...	0.40
Bacillary Exudate . . . .	150	...	6.20	9.5	...	0.39
Amoebic . . . .	46	...	4.90	2.9	...	0.31
Clinical . . . .	70	...	2.52	4.4	...	0.16
Enteric fever (inclusive of typhoid, para. A, B and enteric group).	40	5	6.04	2.5	0.22	0.38
Erysipelas . . . .	1	...	0.00	0.1	...	0.00
Influenza . . . .	118	...	2.65	7.5	...	0.17
Malaria . . . .	983	1	27.50	62.4	0.06	1.75
Measles . . . .	2	...	0.14	0.1	...	0.01
Meningococcal infection (cerebro-spinal fever.)	...	...	...	...	...	...
Mumps . . . .	3	...	0.14	0.2	...	0.01
Plague . . . .	...	...	...	...	...	...
Pneumonia . . . .	48	3	3.58	3.0	0.19	0.23
Pyrexia of uncertain origin . .	31	...	2.09	2.0	...	0.13
Rheumatic fever . . . .	24	...	1.80	1.5	...	0.11



TABLE IV—*concl'd.*

Diseases. (Average strength, 16,130.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Generative system . . .	172	...	7.32	10.7	...	0.45
Organs of locomotion . . .	297	...	16.69	18.4	...	1.03
Areolar tissue . . .	800	...	27.99	49.6	...	1.73
Skin —						
Scabies . . . . .	13	...	0.32	0.8	...	0.02
Other diseases . . . . .	386	...	16.93	23.9	...	1.05
Urinary system . . . . .	68	3	2.06	3.6	0.19	0.13
Injuries—						
General . . . . .	177	17	5.87	11.0	1.05	0.36
Local . . . . .	849	9	36.00	52.6	0.56	2.23
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . . . .	49	1	2.70	3.0	0.06	0.17
Malformations . . . . .	1	...	0.13	0.1	...	0.01
Poisons . . . . .	8	1	0.57	0.5	0.06	0.04
Animal Parasites . . . . .	52	...	1.60	3.2	...	0.10
* No appreciable disease . . . . .	42	...	1.52	2.6	...	0.09
† <i>Suicides</i> . . . . .	(2)	...	(0.66)	(0.1)	...	(0.03)
<b>TOTAL . . . . .</b>	<b>9,056</b>	<b>60</b>	<b>405.24</b>	<b>561.4</b>	<b>3.71</b>	<b>25.12</b>

\* Includes one admission of Diphtheria Carrier.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the totals.

TABLE IV—*contd.*

Diseases. (Average strength, 16,130.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Circulatory system—						
Valvular diseases of the heart.	4	1	0·96	0·2	0·06	0·06
Disordered action of the heart.	21	...	1·37	1·3	...	0·08
Other diseases . . .	19	1	1·29	1·2	0·06	0·08
Blood . . . . .	7	...	0·31	0·4	...	0·02
Spleen . . . . .	1	1	0·05	0·1	0·06	0·00
Lymphatic system . . .	85	...	6·09	5·3	...	0·38
Endocrine glands . . .	5	1	0·35	0·3	0·06	0·02
Breast . . . . .	3	...	0·10	0·2	...	0·01
Respiratory system—						
Larynx and trachea . .	56	...	1·27	3·5	...	0·08
Bronchi and bronchioles	284	...	8·62	16·4	...	0·53
Lung (other than tubercu- losis and pneumonia).	4	...	0·20	0·2	...	0·01
Other diseases . . . .	25	...	1·90	1·5	...	0·12
Teeth and gums . . . .	34	...	0·96	2·1	...	0·06
Digestive system—						
Inflammation of tonsils .	461	...	10·04	28·6	...	0·62
Liver diseases . . . .	193	1	11·26	12·0	0·06	0·70
Other diseases . . . .	999	5	37·97	61·9	0·31	2·35
Diseases due to disorders of nutrition or of metabolism.	2	...	0·11	0·1	...	0·01

TABLE IV—*contd.*

Diseases. (Average strength, 16,130.)		Admission	number by sick.	Ratio per 1,000.		
			per 100	sick	Death	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Pyrexia of uncertain origin	7		0·85	0·4		0·05
Rheumatic fever . . .	11		1·42	0·7		0·09
Sand-fly fever . . .	380		7·56	23·6		0·47
Scarlet fever . . .						
Small-pox . . .						
Tuberculosis—						
Pulmonary . . .	20		4·26	1·3	0·12	0·26
Other . . .	6		1·14	0·4	0·06	0·07
Venereal diseases—						
Gonorrhœa . . .	457		59·07	28·3		3·66
Soft chancre . . .	123		14·40	7·6		0·89
Syphilis . . .	121		10·02	7·5		0·62
Other v. d. . .	1		0·07	0·1		0·00
Typhus fever . . .	...		...	...		...
Other diseases due to infection	19		1·27	1·2	0·06	0·08
<i>Other diseases classified under</i>						
Diseases of the nervous system	157		8·08	9·7	0·06	0·50
Mental diseases . . .	16		2·28	1·0		0·14
Diseases of the—						
Eye . . .	40		2·25	2·5		0·14
Ear and nose . . .	226		7·36	14·0		0·46

## TABLE IV.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

## EASTERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick during the year 1932, with the Ratios per 1,000 of the Strength.*

Diseases. (Average strength, 16,130.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . . .	...	...	...	...	...	...
Dengue . . . . .	210	...	5.42	13.0	...	0.33
Diphtheria . . . . .	21	...	2.16	1.3	...	0.18
Dysentery—						
Bacillary . . . . .	108	...	6.38	6.7	...	0.40
Bacillary Exudate . . . . .	103	...	4.51	6.4	...	0.28
Amoebic . . . . .	69	...	4.78	4.3	...	0.30
Clinical . . . . .	111	...	5.54	6.9	...	0.34
Enteric fever (inclusive of typhoid, para A, B and enteric group).	47	4	6.27	2.9	0.25	0.39
Erysipelas . . . . .	...	...	...	...	...	...
Influenza . . . . .	189	...	4.98	11.7	...	0.31
Malaria . . . . .	1,443	1	36.00	89.5	0.06	2.23
Measles . . . . .	5	...	0.22	0.3	...	0.01
Meningococcal infection (cerebro-spinal fever).	6	4	0.51	0.4	0.25	0.03
Mumps . . . . .	2	...	0.05	0.1	...	0.00
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	71	5	5.84	4.4	0.31	0.36

TABLE III—concl'd.

Diseases. (Average strength, 4,058.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Generative system . . .	35	...	1·84	8·6	...	0·45
Organs of locomotion . . .	79	...	3·70	19·5	...	0·91
Areolar tissue . . .	160	...	6·89	39·4	...	1·70
Skin—						
Scabies . . . . .	3	...	0·11	0·7	...	0·03
Other diseases . . . .	105	...	4·61	25·9	...	1·14
Urinary system . . . .	9	1	2·18	2·2	0·25	0·54
Injuries—						
General . . . . .	5	...	0·10	1·2	...	0·02
Local . . . . .	105	1	9·08	48·1	0·25	2·24
In action . . . . .	...	...	...	...	...	...
Tumours and cysts . . .	7	...	0·35	1·7	...	0·09
Malformations . . . .	...	...	...	...	...	...
Poisons . . . . .	5	...	0·16	1·2	...	0·04
Animal Parasites . . .	8	...	0·15	2·0	...	0·04
No appreciable disease . .	5	...	0·17	1·2	...	0·04
Suicides * . . . . .	(1)	...	(0·04)	(0·2)	...	(0·01)
<b>TOTAL</b>	<b>2,320</b>	<b>11</b>	<b>108·46</b>	<b>571·7</b>	<b>2·71</b>	<b>26·73</b>

\* The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the totals.

TABLE III—*contd.*

Diseases. (Average strength, 4,058.)	Admissions.	Deaths.	Average number constantly sick	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Circulatory system—						
Valvular diseases of the heart.	1	...	0.02	0.2	...	0.00
Disordered action of the heart.	18	...	1.38	4.4	...	0.34
Other diseases . . .	5	...	0.25	1.2	...	0.06
Blood . . . . .	3	...	0.11	0.7	...	0.03
Spleen . . . . .	...	...	...	...	...	...
Lymphatic system . .	10	...	0.49	2.5	...	0.12
Endocrine glands . .	4	...	0.23	1.0	...	0.06
Breast . . . . .	...	...	...	...	...	...
Respiratory system—						
Larynx and trachea . .	1	...	0.03	0.2	...	0.01
Bronchi and bronchioles .	79	...	4.39	19.5	...	1.08
Lung (other than tubercu- losis and pneumonia).	...	...	...	...	...	...
Other diseases . . .	7	...	0.54	1.7	...	0.13
Teeth and gums . . .	16	...	0.43	3.9	...	0.11
Digestive system—						
Inflammation of tonsils .	92	...	2.03	22.7	...	0.50
Liver . . . . .	37	...	2.26	9.1	...	0.56
Other diseases . . .	189	1	8.48	46.6	0.25	2.09
Diseases due to disorders of nutrition or of metabolism.	...	...	0.01	...	...	0.00

TABLE III—*contd.*

Diseases. (Average strength, 4,058.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Pyrexia of uncertain origin .	3	...	0·31	0·7	..	0·03
Rheumatic fever . . .	3	...	0·38	0·7	...	0·09
Sand-fly fever . . .	27	...	0·61	6·7	...	0·15
Scarlet fever . . . .	...	...	..	...	...	...
Small-pox . . . . .	...	...	...	...	...	...
<i>Tuberculosis—</i>						
Pulmonary . . . .	6	...	1·72	1·5	...	0·42
Other . . . . .	5	...	0·45	1·2	...	0·11
<i>Veneral diseases—</i>						
Gonorrhœa . . . .	89	...	12·04	21·9	...	2·97
Soft chancre . . . .	20	...	1·95	4·9	...	0·48
Syphilis . . . . .	12	...	0·75	3·0	...	0·18
Other v. d. . . . .	1	...	0·07	0·2	...	0·02
Typhus fever . . . .	...	...	...	...	...	...
Other diseases due to infection .	4	...	0·17	1·0	...	0·04
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system .	29	...	2·67	7·1	...	0·66
Mental diseases . . . .	6	...	1·25	1·5	...	0·31
<i>Diseases of the—</i>						
Eye . . . . .	13	...	0·55	3·2	...	0·14
Ear and nose . . . .	40	...	1·62	9·9	...	0·40

## TABLE III.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

## WESTERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1932, with the Ratios per 1,000 of the Strength.*

Diseases. (Average strength, 4,058.)	Adm	num fly sick.	Ratio per 1,000.		
		Av	At	Co	tan si
<i>Specific diseases due to infection.</i>					
Cholera . . . . .					
Dengue . . . . .	47	1.22	11.6		0.30
Diphtheria . . . . .					
Dysentery—					
Bacillary . . . . .	85	3.42	20.9		0.84
Bacillary Exudate . . . . .	26	0.74	6.4		0.18
Amoebic . . . . .	64	3.42	15.8		0.84
Clinical . . . . .	15	0.62	3.7		0.15
Enteric fever (inclusive of typhoid, para A, B and enteric group).	15	2.96	3.7	0.25	0.73
Erysipelas . . . . .					
Influenza . . . . .	179	4.14	44.1	0.49	1.02
Malaria . . . . .	532	15.36	131.1	0.49	3.79
Measles . . . . .	5	0.26	1.2		0.06
Meningococcal infection (cerebro-spinal fever).		...	...		...
Mumps . . . . .		0.08	0.5		0.02
Plague . . . . .		...	...		...
Pneumonia . . . . .	14	1.71	3.4	0.74	0.42



TABLE II—*concl'd.*

Diseases. (Average strength, 17,583.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—concl'd.</i>						
Diseases of the—						
Generative system . . .	192	1	10.20	10.9	0.06	0.58
Organs of locomotion . . .	437	...	21.15	24.9	...	1.20
Areolar tissue . . .	943	...	32.65	53.6	...	1.86
Skin—						
Scabies . . . . .	11	...	0.54	0.6	...	0.03
Other diseases . . . .	372	...	16.45	21.2	...	0.94
Urinary system . . . .	76	1	6.08	4.3	0.06	0.35
Injuries—						
General . . . . .	41	4	1.68	2.3	0.23	0.10
Local . . . . .	1,102	10	48.56	62.7	0.57	2.76
In action . . . . .	...	1	...	...	0.06	...
Tumours and cysts . . .	59	...	3.47	3.4	...	0.20
Malformations . . . .	3	...	0.37	0.2	...	0.02
Poisons . . . . .	9	...	0.12	0.5	...	0.01
Animal Parasites . . . .	38	...	0.77	2.2	...	0.04
No appreciable disease* . .	43	...	1.96	2.4	...	0.11
Suicides † . . . . .	(1)	(3)	(0.00)	(0.1)	(0.17)	(0.00)
TOTAL . . . . .	11,162	57	472.05	634.8	3.24	26.85

\* Includes Diphtheria Carrier 2 admissions, Dysentery Carrier 1 admission and Typhoid Carrier 1 admission.

† The figures against "Suicides" having already been shown under the heading of the injury, etc., which caused death, are not included in the totals.

TABLE II—*contd.*

Diseases. (Average strength, 17,583.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Other diseases classified under systems—contd.</i>						
Diseases of the—						
Circulatory system—						
Valvular diseases of the heart.	18	...	1.75	0.7	...	0.10
Disordered action of the heart.	45	...	2.21	2.6	...	0.13
Other diseases . . . .	23	1	1.57	1.3	0.06	0.09
Blood . . . . .	14	...	0.71	0.8	...	0.04
Spleen . . . . .	2	...	0.05	0.1	...	0.00
Lymphatic system . . .	37	...	1.73	2.1	...	0.10
Endocrine glands . . .	5	...	0.60	0.3	...	0.03
Breast . . . . .	10	...	0.35	0.6	...	0.02
Respiratory system—						
Larynx and trachea . .	26	...	0.69	1.5	...	0.04
Bronchi and bronchioles .	283	...	8.88	16.1	...	0.50
Lung (other than tubercu- losis and pneumonia).	7	...	1.87	0.4	...	0.11
Other diseases . . . .	41	...	3.49	2.3	...	0.20
Teeth and gums . . . .	45	...	0.81	2.6	...	0.05
Digestive system—						
Inflammation of tonsils .	732	...	18.78	41.6	...	1.07
Liver diseases . . . .	176	...	11.10	10.0	...	0.63
Other diseases . . . .	1,059	5	38.95	60.2	0.28	2.22
Diseases due to disorders of nutrition or of metabolism.	2	...	0.49	0.1	...	0.03

TABLE II—*contd.*

Diseases. (Average strength, 17,583.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection—contd.</i>						
Pyrexia of uncertain origin . . . . .	60	...	3·91	3·4	...	0·22
Rheumatic fever . . . . .	39	1	4·57	2·2	0·06	0·26
Sandfly fever . . . . .	1,490	...	30·73	84·7	...	1·75
Scarlet fever . . . . .	3	...	0·25	0·2	...	0·01
Small-pox . . . . .	3	...	0·16	0·2	...	0·01
Tuberculosis—						
Pulmonary . . . . .	15	1	3·20	0·9	0·06	0·18
Other . . . . .	6	...	1·14	0·3	...	0·06
Venereal diseases—						
Gonorrhœa . . . . .	358	...	50·21	20·4	...	2·86
Soft chancre . . . . .	38	...	3·91	2·2	...	0·22
Syphilis . . . . .	76	...	5·65	4·3	...	0·32
Other v. d. . . . .	5	...	0·30	0·3	...	0·02
Typhus fever . . . . .	2	1	0·15	0·1	0·06	0·01
Other diseases due to infection . . . . .	19	2	2·64	1·1	0·11	0·15
<i>Other diseases classified under systems.</i>						
Diseases of the nervous system . . . . .	119	3	6·06	6·8	0·17	0·34
Mental diseases . . . . .	16	...	3·44	0·9	...	0·20
Diseases of the—						
Eye . . . . .	44	...	2·11	2·5	...	0·12
Ear and nose . . . . .	280	1	9·27	15·9	0·06	0·53

TABLE II.

WARRANT OFFICERS, N. C. Os. AND MEN—*contd.*

## NORTHERN COMMAND.

*Table showing the Average Strength, Admissions into Hospital, Deaths and Constantly Sick, during the year 1932, with the Ratios per 1,000 of the Strength.*

Diseases. (Average strength, 17,583.)	Admissions.	Deaths.	Average number constantly sick.	Ratio per 1,000.		
				Admissions.	Deaths.	Constantly sick.
<i>Specific diseases due to infection.</i>						
Cholera . . . . .	...	...	...	...	...	...
Dengue . . . . .	8	...	0.29	0.5	...	0.02
Diphtheria . . . . .	17	...	1.79	1.0	...	0.10
Dysentery—						
Bacillary . . . . .	162	...	8.24	9.2	...	0.47
„ Exudate . . . . .	77	...	3.45	4.4	...	0.20
Amœbic . . . . .	33	...	2.93	1.9	...	0.17
Clinical . . . . .	106	...	5.94	6.0	...	0.34
Enteric fever (inclusive of typhoid, para A, B and enteric group).	85	5	13.17	4.8	0.28	0.75
Erysipelas . . . . .	3	...	0.18	0.2	...	0.01
Influenza . . . . .	516	...	13.28	29.3	...	0.76
Malaria . . . . .	1,612	3	46.49	91.7	0.17	2.64
Measles . . . . .	1	...	0.08	0.1	...	0.00
Meningococcal infection (cerebro- spinal fever).	2	2	0.14	0.1	0.11	0.01
Mumps . . . . .	5	...	0.22	0.3	...	0.01
Plague . . . . .	...	...	...	...	...	...
Pneumonia . . . . .	116	15	10.12	6.6	0.85	0.58

TABLE I—*concl'd.*

Diseases. (Average strength, 55,336.)		Admissions	Number sick.	Ratio per 1,000.	Ratio per 1,000.	Ratio per 1,000.
Other diseases classified under systems—contd.		Admissions	Number sick.	Ratio per 1,000.	Ratio per 1,000.	Ratio per 1,000.
Diseases of the—						
Respiratory system—						
Lung (other than tuberculosis and pneumonia).	13	2.10	0.1	0.07	0.04	
Other diseases . . .	96	7.25	1	0.05	0.13	
Teeth and gums . . .	132	3.22	2		0.06	
Digestive system—						
Inflammation of tonsils .	1,864	45.09	33		0.81	
Liver diseases . . .	590	35.89	10	0.07	0.09	0.65
Other diseases . . .	3,298	15	125.02	59.6	0.27	0.27
Diseases due to disorders of nutrition or of metabolism.		8	5	0.99	0.1	0.09
Diseases of the—						
Generative system . . .		690	1	34.08	12.5	0.02
Organs of locomotion . .	1,156	45	60.08	20.9		0.81
Areolar tissue	2,816	4	102.31	50.9		0.07
Skin—						
Scabies . . .	61	..	2.09	1.1		0.04
Other diseases	1,226	6	57.68	22		0.11
Urinary system	226	6	10	15.98	4.1	0.11
Injuries—						
General . . .	235	27	2	7.89	4.2	0.49
Local . . .	3,239	26	33	140.19	58.5	0.47
In action . . .		1			0.02	
Tumors and cysts . . .	168	1		9.77	3.0	0.02
Malformations . . .	8			0.83	0.1	
Poisons . . .	59			1.36	1.1	0.02
Animal parasites . . .	202			4.83	3.5	
No appreciable disease†	148			5.53	2.7	
Suicides * . . .	(6)	(6)		(0.67)	(0.1)	(0.11)
TOTAL	32,177	164	409	1458.31	581.5	2.96

\* The figures against "Suicides" having already been shown under the heading of injury, etc., which caused death are not included in the total.

† Includes 6 admissions for Diphtheria Carrier, 2 admissions for Dysentery Carrier and 1 admission for Typhoid Carrier.

TABLE I—*contd.*

Diseases. (Average strength, 55,336.)	Admissions.	Deaths.	Invalids sent home.	Average number constantly sick.	Ratio per 1,000.			
					Admissions.	Deaths.	Invalids sent home.	Constantly sick.
<i>Specific diseases due to infection— contd.</i>								
Sand-fly fever . . . . .	2,262	...	...	47·67	40·9	...	...	0·86
Scarlet fever . . . . .	4	...	...	0·36	0·1	...	...	0·01
Small-pox . . . . .	4	...	...	0·23	0·1	...	...	0·00
Tuberculosis— Pulmonary . . . . .	58	3	44	13·83	1·0	0·05	0·30	0·25
Other . . . . .	19	1	15	3·01	0·3	0·02	0·27	0·03
Venereal diseases— Gonorrhoea . . . . .	1,445	...	5	200·34	26·1	...	0·09	3·62
Soft chancre . . . . .	303	...	...	33·39	5·5	...	...	0·60
Syphilis . . . . .	330	...	3	28·57	6·0	...	0·05	0·52
Other v. d. . . . .	8	...	...	0·47	0·1	...	...	0·01
Typhus fever . . . . .	8	1	...	0·61	0·1	0·02	...	0·01
Other diseases due to infection . . . . .	48	4	2	4·34	0·9	0·07	0·04	0·08
<i>Other diseases classified under systems.</i>								
Diseases of the nervous system. . . . .	507	5	52	27·99	9·2	0·09	0·94	0·51
Mental diseases . . . . .	65	...	49	14·32	1·2	...	0·89	0·26
Diseases of the— Eye . . . . .	159	...	9	7·75	2·9	...	0·16	0·14
Ear and nose . . . . .	881	1	21	30·20	15·9	0·02	0·38	0·55
Circulatory system— Valvular diseases of the heart . . . . .	26	2	20	3·67	0·5	0·04	0·36	0·07
Disordered action of the heart . . . . .	136	...	2	7·80	2·5	...	0·04	0·14
Other diseases . . . . .	70	3	9	4·50	1·3	0·05	0·16	0·08
Diseases of the— Blood . . . . .	33	...	...	1·83	0·6	...	..	0·03
Spleen . . . . .	5	2	...	0·17	0·1	0·04	...	0·00
Lymphatic system . . . . .	260	1	...	17·91	4·7	0·02	...	0·32
Endocrine glands . . . . .	14	1	6	1·20	0·3	0·02	0·11	0·02
Breast . . . . .	14	...	...	0·48	0·3	...	...	0·01
Respiratory system— Larynx and trachea . . . . .	100	...	...	2·35	1·8	...	...	0·04
Bronchi and bronchioles . . . . .	935	...	14	32·12	16·9	...	0·25	0·58

## TABLE I.

WARRANT OFFICERS, N. C. Os. AND MEN.

## INDIA.

*Table showing the Average Strength, Admissions into Hospital, Deaths, Number Invalided and Constantly Sick, during the year 1932, with Ratios per 1,000 of the Strength.*

Ratio per 1,000.

(Average strength, 55,336.)							
		Invalid	Average sick	Deaths	Invalids sent home	Suicide	
<i>Specific diseases due to infection.</i>							
Cholera . . . . .							
Dysentery . . . . .	432		10.88	7.8			0.20
Diphtheria . . . . .	73			1.3			0.13
Dysentery—							
Bacillary . . . . .	508		24.85	9.2	0.04		0.45
Exudate			15.04	6.5	0.02		0.27
Amoebic	215		16.27	3.9	0.04		0.29
Clinical	304		14.69	5.5	0.05		0.26
Enteric fevers (inclusive of typhoid, para A, B and C, and enteric group).	188	15	28.62	3.4	0.27	0.02	0.52
Erysipelas			0.18	0.1	...		0.00
Influenza	1,038		25.76	18.8	0.04		0.47
Malaria . . . . .	4,654		128.00	84.1	0.13	0.02	2.31
Measles	14		0.73	0.3	...		0.01
Meningococcal infection (cerebro-spinal fever).	8		0.65	0.1	0.11		0.01
Mumps . . . . .	12		0.49	0.2			0.01
...							
Pneumonia . . . . .	254	27	21.74	4.6	0.49	0.07	0.39
Pyrexia of uncertain origin	106		7.39	1.9			0.13
Rheumatic fever . . . . .	79		8.56	1.4	0.02	0.07	0.15

Fort Janrud (Highest Tower).	607	S. D.	Ht. Tower.	EASTERN COMMAND.			S. D.	525	S. D.	S. B. M.	Kampee (Ry. Station)	940	"	B. M.
Jhelum . . . . .	762	"	S. B. M.	Agra (Fort) . . . . .							Madras (Obey.) . . . . .	250	G. T.	"
Jullundur Cantonment .	771	"	B. M.	Allahabad and Fort .				314	"	"	Malapuram (Ry. Station)	1,887	S. D.	"
Jutogh . . . . .	6,370	"	Map.	Bareilly . . . . .				563	"	"	Mount Abu Sanatorium .	3,838	"	"
Kalabagh and Baragali .	7,963	"	"	Barrackpore . . . . .				24	"	"	Nasirabad . . . . .	1,461	"	Map.
Kalabagh and Mari Indus	682	"	"	Benares . . . . .				256	"	"	Pachmarhi . . . . .	3,490	"	"
Kasauli Convalescent	6,050	"	"	Cawnpore . . . . .				407	"	B. M.	Poona . . . . .	1,887	"	S. B. M.
Kohat . . . . .	1,725	"	Map.	Chakrata . . . . .				6,885	"	Map.	Puraadhar . . . . .	4,560	"	"
Khanpur and Ghora	7,721	"	"	Delhra Dun . . . . .				2,232	"	S. B. M.	S. Thomas Mount (Ry. Station).	34	"	B. M.
Kuldsana . . . . .	7,049	S. G.	"	Delhi . . . . .				757	"	"	Saugor . . . . .	1,755	"	S. B. M.
Lahore Cantonment and	706	S. D.	S. B. M.	Dinapore . . . . .				170	"	Church.	Secunderabad . . . . .	1,776	"	"
Landikotal . . . . .	3,509	"	Map.	Fakohgash . . . . .				467	"	"	Wellington (Sta. Hospital).	5,800	"	Map.
Malakand . . . . .	2,740	"	"	Fort William . . . . .				17	S. G.	"				
Manzai . . . . .	1,650	"	"	Fyabed . . . . .				330	S. D.	S. B. M.				
Mardan . . . . .	1,000	"	"	Jhansi . . . . .				849	"	"	BUEMA INDEPENDENT DISTRICT.			
Mitrali . . . . .	"	"	"	Landour Convalescent				7,398	G. T. S.	"	Mandalay (Fort Dufferin)	248	"	"
Multan . . . . .	404	S. D.	S. B. M.	Landour Depôt.				5,823	S. D.	Map.	Maymyo . . . . .	3,608	"	Map.
Murree Convalescent	7,073	"	Map.	Lansdowne . . . . .				6,000	"	"	Meiktila . . . . .	"	"	"
Nowshera (Ry. Station) .	943	"	B. M.	Lehlong . . . . .				368	"	B. M.	Mingaladon . . . . .	"	"	"
Parachinar . . . . .	"	"	"	Lucknow Kalbir's				787	"	S. B. M.	Port Blair (Tindal Obey.)	9	S. D.	B. M.
		"	"	Meerut . . . . .				560	"	"				
		"	"	Multra . . . . .					"	"				

S. D. = Survey Department.  
S. B. M. = Standard Bench Mark.  
B. M. = G. T. Bench Mark.  
S. G. = Surveyor-General of India.

Map = Heights taken from Topo. Maps.  
M. O. = Medical officer in charge of military hospital in their sanitary reports.  
I. B. = Intelligence Branch of the Division of the Chief of the Staff.



TABLE A.

STATIONS BY COMMANDS AND INDEPENDENT DISTRICTS.

Stations.	Height above M. S. level in feet.	Authority for height.	Points of reference.	Stations.	Height above M. S. level in feet.	Authority for height.	Points of reference.	Stations.	Height above M. S. level in feet.	Authority for height.	Points of reference.
NORTHERN COMMAND.				NORTHERN COMMAND— <i>contd.</i>				EASTERN COMMAND— <i>contd.</i>			
Abbottabad . . .	4,010	S. D.	Map.	Peshawar . . .	1,432	S. D.	S. B. M.	Naini Tal Convalescent Depôt.	6,400	S. D.	S. B. M.
Ambala . . .	902	"	S. B. M.	Rawalpindi . . .	1,089	"	"	Nowgong . . .	735	"	B. M.
Amritsar . . .	754	"	"	Rashtak . . .	6,556	"	Map.	Banikhot and Chambhatta.	{ 5,980 6,942	"	"
Bannu . . .	1,550	"	Map.	Risalpur . . .	1,014	"	B. M.	Roorkee . . .	579	S. D.	S. B. M.
Barian Camp and Khyregali.	{ 7,193 7,778	I. B. S. D.	"	Sargodha (Hy. Rest House).	615	"	"	Sitapur . . .	447	"	"
Campbellpore . . .	1,180	S. D.	Map.	Siakot . . .	829	"	"	SOUTHERN COMMAND.			
Cherat . . .	4,516	"	"	Solon . . .	5,078	B. M.	"	Ahmedabad . . .	162	"	"
Chakdara . . .	2,358	"	"	Sabathu . . .	4,000	S. D.	Map.	Ahmednagar . . .	2,180	"	Map.
Dagshai . . .	6,087	"	"	Thall . . .	2,450	"	"	Bangalore . . .	8,002	"	S. B. M.
Dalhousie Convalescent Depôt.	7,087	"	"	Upper Topa . . .	7,000	M. O.	"	Belgaum . . .	2,523	"	"
Dargai . . .	1,540	"	"	Wana . . .	"	"	"	Colaba (Bombay Town Hall).	20	"	"
Dera Ismail Khan . . .	508	"	"	WESTERN COMMAND.				Deolali . . .	1,594	"	"
Drosh . . .	4,940	"	"	Hyderabad . . .	96	S. D.	S. B. M.	Jubbulpore . . .	1,320	"	"
Ferozepore . . .	649	"	"	Karachi (Holy Trinity Church).	28	"	Map.				
Ghazial . . .	6,511	S. G.	"	Loralai . . .	4,099	"	S. B. M.				
				Quetta . . .	5,510	"	"				

# **APPENDICES.**

## **SECTION I.**

### **BRITISH TROOPS, 1932.**

## Recruiting.

45. The total number of recruits examined at recruiting centres in the year ending 31st March 1933 was 21,791. Of these, 9,787 were rejected, giving a percentage of 44·91 per cent. The corresponding figures for the year 1931-32 was 48·3 per cent.

The principal causes of rejection of recruits for the year ending 31st March 1933 were as follows:—

TABLE R.

Disability.	No. of men rejected as unfit for enrolment, out of 21,791 presented at recruiting centres only.		No. of recruits found unfit during training out of 20,033 enrolled (11,721 recruits en- rolled at recruiting centres and 8,312 at Unit Headquarters).	
	Actuals.	Percent- age.	Actuals.	Percent- age.
Malaria (enlarged spleen)	1,050	4·82		0·01
Tuberculosis (pulmonary)	26	0·12		0·03
"    (other organs)	19	0·09		
Venereal disease	85	0·39		
Other diseases due to infection	9	0·04		
Diseases of the nervous system	17	0·08		0·03
Defective vision	312	1·43		
Trachoma	844	3·87	12	0·06
Other eye affections	269	1·23	2	0·01
Otitis media	371	1·70	6	0·03
Defective hearing	28	0·13	1	
Other ear diseases	230	1·06	1	
Diseases of nose and throat	354	1·62		
Valvular diseases of heart	261	1·20	1	
Disordered action of heart	1,206	5·53	3	0·01
Varicose veins	192	0·88		
Hæmorrhoids	79	0·36		
Varicocele	153	0·70		
Other diseases of circulatory system	24	0·11		
Anæmia	394	1·81		
Goitre	308	1·41		
Respiratory diseases excluding tuberculosis	33	0·15		0·02
Pyorrhæa	470	2·16		
Loss or decay of teeth	46	0·21		
Hernia	178	0·82		
Other diseases of digestive system	17	0·08		
Ankylosis of joint	104	0·48	1	
Flat foot	121	0·56	2	0·01
Knock knee.	218	1·00	2	0·01
Curvature of spine	338	1·55	3	0·01
Other deformities	434	1·99		
Skin diseases	232	1·06	1	
Poor physique	352	1·62	3	0·01
Other causes	1,013	4·65	39	0·19
<b>TOTAL</b>	<b>9,787</b>	<b>44·91</b>	<b>97</b>	<b>0·48</b>

### Minor Septic Diseases.

42. This group produced 3,677 admissions giving a ratio of 30·4 per 1,000 of strength. Included in the group were:—

Cellulitis . . . . .	2,515
Boils . . . . .	534
Abscess . . . . .	312
Inflammation of lymphatic glands and vessels . . . . .	181

### Local Injuries.

43. There were 5,293 admissions in this group. The ratio per 1,000 is 43·7 compared with 42·4 in 1931.

### Followers.

44. The total admissions 7,525 or 266·4 per 1,000 of the strength compared with 285·8 in 1931.

The table below gives figures for certain endemic and infectious diseases amongst followers:—

TABLE P.

	Admissions.	
	Actuals.	Ratio per 1,000
Malaria . . . . .	2,563	90·7
Pneumonia . . . . .	281	9·9
Veneral diseases* . . . . .	292	10·8
Sandfly fever . . . . .	210	7·4
Dysentery . . . . .	220	7·8
Influenza . . . . .	166	5·9
Diarrhoea . . . . .	99	3·5
Pulmonary tuberculosis . . . . .	61	2·2
Scabies . . . . .	92	3·3
Enteric group of fever . . . . .	35	1·2
Dengue . . . . .	14	0·5
Small-pox . . . . .	1	0·2

\*(Gonorrhoea 129, Syphilis 102 and Soft chancre 46 and 15 N. Y. D. venereal cases.)

There were 109 deaths with a ratio of 3·86.

The principal causes were:—

TABLE Q.

	Actuals.	Ratio per 1,000
Pneumonia . . . . .	57	2·02
Digestive diseases . . . . .	2	0·07
Other infectious diseases . . . . .	5	0·18
Malaria . . . . .	1	0·04
Pulmonary tuberculosis . . . . .	5	0·18
Other respiratory diseases . . . . .	11	0·39
Injuries . . . . .	7	0·25
Enterica . . . . .	2	0·07
Nervous diseases . . . . .	1	0·04
Poisoning . . . . .	4	0·14
Circulatory system . . . . .	6	0·21

### Diseases of the Circulatory System.

39. Circularly diseases caused 101 admissions to hospital, giving a ratio of 0·8 per 1,000 compared with 1·2 in 1931, 1·3 in 1930 and 1929, 1·6 in 1928, 1·3 in 1927, 1·3 in 1926, 1·7 in 1925 and 1·0 in 1913.

There were 12 deaths from this group of diseases giving a ratio per 1,000 of 0·10 compared with 0·09 in 1931, 0·15 in 1930, 0·11 in 1929, 0·10 in 1928, 0·12 in 1927, 0·15 in 1926, 0·09 in 1925 and 0·11 in 1924.

The important diseases in this group were:—

Disordered action of the heart . . . . .	26
Diseases of the heart valves . . . . .	11
Varix . . . . .	27

### Diseases of Respiratory System.

40. The admissions for diseases of the respiratory system totalled 3,257 inclusive of pneumonia and tuberculosis (1,215) a ratio of 26·9 per 1,000. Of these 1,605 were due to bronchitis giving ratio per 1,000 of 13·3 compared with 18·0 for 1931. There were eight deaths and 44 cases were invalided.

The other important diseases in the group were pleurisy 224, laryngitis 106 and asthma 64.

### Diseases of the Digestive System.

41. There were 6,140 admissions for the diseases of the digestive system with 20 deaths and 19 invalids, the ratios per 1,000 were admissions 50·7, deaths 0·17 and invalids 0·16 respectively.

The most important individual diseases were:—

TABLE O.

	Admissions.	Deaths.	Invalids.
Pharyngitis . . . . .	2,187	...	...
Diarrhoea . . . . .	773	...	...
Tonsillitis . . . . .	744	...	...
Jaundice . . . . .	449	3	...
Indigestion . . . . .	409	...	...
Constipation . . . . .	402	...	...
Hæmorrhoids . . . . .	255	...	...
Colic . . . . .	161	...	...
Appendicitis . . . . .	160	5	2
Gastritis . . . . .	103	...	1
Hepatitis . . . . .	68	1	3

In addition to the above there were 86 cases of hernia with eight invalids. Tuberculosis of various abdominal organs produced seven admissions, and one case of gastric ulcer occurred which died.

### Small-pox.

35. There were 22 admissions with three deaths giving a ratio of 0.2 and 0.02 per 1,000. 99.40 per cent. of the troops were protected by vaccination within five years.

### Tuberculosis.

36. Pulmonary tuberculosis caused 251 admissions with 16 deaths and 251 invalids giving ratios per 1,000 of 2.1, 0.13 and 2.1 respectively (16 cases remained from 1931).

There were 42 admissions for tuberculosis of other organs with three deaths and 25 invalids giving ratios per 1,000 of 0.3, 0.02 and 0.21 respectively.

### Venereal Diseases.

37. This group accounted for 1,314 admissions of which 1,160 were fresh infections and 154 relapses. The ratio per 1,000 for all admissions fell from 11.0 in 1931 to 10.9 in 1932.

TABLE N.

Diseases.	Admissions.		Percentage.	
	1932.	1931.	Increase.	Decrease.
			Per cent.	Per cent.
Gonorrhoea . . . . .	642	675	...	4.89
Syphilis . . . . .	444	472	...	5.93
Soft chancre . . . . .	228	223	2.24	...

### Other Diseases Due to Infection.

38. There were 2,056 admissions under this heading. The diseases mainly responsible were:—

1. Influenza . . . . .	1,241
2. Mumps . . . . .	289
3. Chicken-pox . . . . .	170
4. Measles . . . . .	98
5. Rheumatic fever . . . . .	64
6. Tropical sore . . . . .	53
7. Relapsing fever . . . . .	29
8. Kala-azar . . . . .	14
9. Typhus fever . . . . .	10
10. Cerebro-spinal fever . . . . .	9
11. Leprosy . . . . .	8
12. Plague . . . . .	6
13. Undulant fever . . . . .	5
14. Cholera . . . . .	4

**Pneumonia.**

32. The incidence of the disease during the year compared with previous years, was as follows:—

TABLE M.

Years.	Admissions.		Deaths.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1920	3,772	17·4	833	3·85
1921	2,796	15·9	644	3·67
1922	2,077	14·0	412	2·79
1923	1,972	13·8	343	2·39
1924	2,066	15·3	381	2·83
1925	1,722	12·6	267	1·96
1926	1,508	11·2	230	1·70
1927	1,367	10·3	190	1·43
1928	1,097	8·4	147	1·12
1929	1,167	9·1	181	1·40
1930	1,147	9·0	159	1·24
1931	1,078	8·7	132	1·06
1932	961	7·9	97	0·80

Of the 961 cases admitted 836 were lobar and 125 lobular in type. The case mortality of the two types were 10·05 and 10·40 per cent., respectively.

The incidence by Commands was:—

	Ratio per 1,000.
Northern Command . . .	9·3
Western Command . . .	8·5
Eastern Command . . .	7·0
Southern Command . . .	5·4
Burma District . . .	5·5

**Pyrexia of Uncertain Origin.**

33. 21 cases were included under this head giving a ratio of 0·2 per 1,000 compared with 0·3 in 1931.

**Sandfly Fever.**

34. The admissions for this disease decreased from 2,025 to 1,850, giving a ratio per 1,000 of strength of 15·3 compared with 16·3 in 1931. The incidence fell chiefly on the troops in Zhob Independent Brigade Area, Waziristan District, Rawalpindi District, Lahore District and Baluchistan District with ratios per 1,000 of 31·7, 20·8, 7·2, 7·1 and 2·2 respectively.

The following table shows the incidence of the various types of the disease by Commands.

TABLE L.

Commands and Independent District.		Admissions and Deaths.							
		Actuals.				Ratio per 1,000.			
		B. T.	M. T.	Qtn.	Clin.	B. T.	M. T.	Qtn.	Clin.
Northern	{ A.	5,359	2,345	18	1,729	92.50	40.50	0.30	29.90
	{ D.	3	5	..	2	0.05	0.09	..	0.03
Western	{ A.	1,567	629	3	252	110.90	44.50	0.20	17.80
	{ D.	..	..	..	..	..	..	..	..
Eastern	{ A.	2,002	703	18	317	84.30	29.60	0.80	13.30
	{ D.	..	..	..	..	..	..	..	..
Southern	{ A.	970	523	8	110	47.00	25.40	0.40	5.30
	{ D.	...	..	..	..	..	..	..	..
Burma	{ A.	403	80	1	311	87.90	17.40	0.20	67.80
	{ D.	..	2	..	..	..	0.44	..	..
All-India	{ A.	10,301	4,280	48	2,719	85.10	35.40	0.40	22.50
	{ D.	3	7	..	2	0.02	0.06	..	0.02

The stations with an average annual strength of over 1,000 showing the highest incidence were:—

1. Fort Sandeman	461.4
2. Bannu	396.2
3. Wana	347.8
4. Kohat	277.9
5. Dehra Dun	245.4
6. Jhansi	244.4
7. Karachi	236.8
8. Maymyo	230.4
9. Peshawar	218.3
10. Loralai	201.0
11. Shillong	189.4
12. Mandalay	176.6
13. Delhi	171.4



Other points of interest regarding these fevers have been discussed at length in the section of the report dealing with British troops, where in many cases figures for British and Indian troops are combined.

The inoculation state of the troops is good. In September when the last return was rendered, the figures were as follows:—

TABLE J.

	British Officers attached to Indian Units.	Indian Ranks.	Followers.
Strength . . . . .	1,899	119,202	26,441
Number protected . . . . .	1,764	117,566	25,571
Number unprotected . . . . .	135	1,636	870
Percentage protected . . . . .	92.89	98.63	96.70

The relative incidence and deaths among protected and unprotected cases of Indian Ranks are shown below. The figures representing protected and unprotected are obtained by making an average of the two half yearly returns and represent therefore an approximate and not an actual figure. The figures regarding incidence and death are taken from special report forms rendered regarding enteric fever.

TABLE K.

Group.	Strength.	Actuals.		Ratio per 1,000.		Case Mortality per cent.
		Cases.	Deaths.	Cases.	Deaths.	
Protected . . . . .	118,444	222	13	1.9	0.11	5.86
Unprotected . . . . .	1,952	35	4	17.9	2.05	11.43

### Malaria.

31. The admissions for all forms of malaria totalled 17,558 with 12 deaths and eight invalids. The ratio per 1,000 of strength contrasted with 1929, 1930 and 1931 were:—

	1929.	1930.	1931.	1932.
Admissions	175.3	153.4	149.4	145.1
Deaths . . . . .	0.15	0.13	0.10	0.10
Invalids . . . . .	0.21	0.06	0.08	0.07

There is therefore a further slight decrease from 1931. Western Command again shows an increase. Eastern and Southern Commands remain practically stationary, and Northern Command and Burma District show a decrease.

Various problems relating to malaria and anti-malarial measures are discussed in detail in the section referring to British troops.

The admissions for various types of dysentery during the past seven years are shown below. As for British troops in 1931, the cases with bacillary exudates have been included in the bacillary group.

—	1926.	1927.	1928.	1929.	1930.	1931.	1932.
Amoebic dysentery . .	184	205	77	116	213	124	251
Bacillary " . .	280	346	481	810	1,628	1,435	1,371
Clinical " . .	951	992	1,032	935	680	512	398

The percentage of the different types of dysentery in 1932 were:—

	Per cent.
Dysentery amoebic	12.43
Dysentery bacillary	67.87
Dysentery clinical	19.70

This shows a further decrease in the proportion of "clinical" cases, which is more or less similar to that occurring in British troops.

There were 127 cases in excess of amoebic dysentery than in 1931. The fluctuation in the percentage of amoebic dysentery is, as in previous years, traceable to Quetta, the station which shows the highest incidence of all types of dysentery. The problem is under special investigation.

The majority of the cases of dysentery were mild, and in all only three deaths occurred in 2,020 cases, the percentage death rate of admissions being therefore 0.15 per cent.

The distribution of the various forms of dysentery by commands is shown below in ratios per 1,000 of strength:—

TABLE I.

—	Dysentery. —			
	Amoebic.	Bacillary (bacteriologically proven).	Bacillary exudate.	Clinical.
Northern Command . .	0.8	5.3	3.7	3.7
Western " . .	9.6	12.7	4.7	4.0
Eastern " . .	1.8	6.6	4.9	2.5
Southern " . .	0.9	7.4	6.1	2.7
Burma District . .	1.7	7.0	4.4	1.7

### Enteric Group of Fevers.

30. There were 55 less cases than in 1931, giving a ratio of 2.1 admissions per 1,000 of strength, as compared with a ratio of 2.5 per 1,000 in 1931.

There were 17 deaths among the 256 admissions or 6.64 per cent., and a death rate of 0.14 per 1,000 of strength as compared with 0.23 in 1931.

## PRINCIPAL DISEASES AFFECTING THE INDIAN ARMY.

**Dengue.**

28. 141 cases are included under this heading giving a ratio of 1·2 per 1,000 compared with 1·8 in 1931. The stations principally affected were:—

	Actual.	Ratio per 1,000.
Mandalay . . . . .	67	53·3
Mingaladon . . . . .	32	29·1
Bangalore . . . . .	15	5·9
Alipore . . . . .	11	7·7

**Dysentery, Diarrhoea and Colitis.**

29. Admission and death ratios for dysentery, diarrhoea and colitis for the years 1913, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931 and 1932 are given in table H.

TABLE H.

Years.	Dysentery.		Diarrhoea.		Colitis.		Combined.	
	A.	D.	A.	D.	A.	D.	A.	D.
1913 . . . . .	11·7	0·09	13·7	0·01	4·5	...	29·9	0·10
1924 . . . . .	6·5	0·04	12·2	...	11·2	...	30·0	0·04
1925 . . . . .	6·5	0·03	13·8	...	5·5	...	23·8	0·03
1926 . . . . .	10·6	0·02	14·0	...	0·3	...	24·8	0·02
1927 . . . . .	11·6	0·03	10·8	...	0·2	...	22·6	0·03
1928 . . . . .	12·1	0·05	11·4	0·01	0·3	0·1	23·8	0·06
1929 . . . . .	14·4	0·05	10·2	...	0·4	...	25·0	0·05
1930 . . . . .	19·7	0·09	8·0	...	0·3	...	27·9	0·09
1931 . . . . .	16·7	0·03	7·6	...	0·2	...	24·6	0·03
1932 . . . . .	16·7	0·02	6·4	...	0·2	...	23·3	0·02

There were 2,814 admissions for this group of diseases, a decrease of 232 cases and of 1·3 ratio per 1,000 as compared with 1931. The death rate has again fallen.

G—contd.

Strength over 2,000.

Meerut.	Jhelum.	Nowshera.	Sialkot.	Trimulgherry.	Bangalore.	Kirkee.
2,545	2,020	2,787	2,830	2,618	2,522	2,288
362.70 1.57	360.90 4.46	359.20 2.51	281.30 1.41	273.50 2.67	236.70 2.79	229.70 0.89
16.93	14.22	13.05	11.20	12.87	10.21	6.20
59.30 ...	41.10 0.50	108.00 ...	78.10 0.35	48.30 ...	30.50 ...	59.40 ...
12.60 ...	8.40 ...	6.80 ...	1.40 ...	5.00 ...	...	0.90 ...
2.40 ...	1.00 0.50	1.10 0.36	1.80 ...	4.20 0.38	2.40 ...	0.40 ...
16.10 ...	4.50 ...	15.00 ...	3.20 ...	29.10 ...	8.80 ...	13.80 ...
2.70 ...	12.90 ...	1.10 ...	9.20 ...	1.50 ...	3.20 ...	2.20 ...
3.50 ...	...	13.80 ...	...	...	6.80 ...	1.80 ...
5.90 ...	9.90 1.49	8.60 2.15	7.40 ...	1.50 ...	5.20 ...	7.10 0.45
22.40 ...	7.90 ...	11.10 ...	0.70 ...	6.10 ...	15.10 ...	12.10 ...
33.40 ...	36.10 ...	45.20 ...	39.20 ...	24.10 ...	20.30 ...	14.30 ...
65.20 0.39	64.40 0.50	42.30 ...	47.30 0.71	42.40 0.38	19.50 0.80	24.60 ...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	0.40	...	...	...
...	...	...	...	...	...	...
1.20 0.39	3.00 ...	2.50 ...	3.50 ...	1.50 ...	...	1.40 ...
2.00 0.39	3.00 ...	1.40 ...	1.40 ...	0.80 ...	...	1.80 ...

TABLE

Stations with

STATIONS.			Rav yindī	Quetta.
Strength . . . . .	2,257	3,847	4,404	7,385
All causes—				
Admissions . . . . .	401·00	396·40	378·10	377·10
Deaths . . . . .	1·77	2·60	3·63	2·17
Average constantly sick . . . .	16·87	12·57	15·87	16·45
Malaria—				
Admissions . . . . .	102·80	162·70	135·10	89·00
Deaths . . . . .		0·26		
Sandfly fever—				
Admissions . . . . .	2·70	3·10	9·30	1·20
Deaths . . . . .				
Enteric group of fevers—				
Admissions . . . . .	1·70	1·60	2·70	3·30
Deaths . . . . .		0·26	0·23	0·41
Dysentery—				
Admissions . . . . .	13·80	5·70	9·60	44·40
Deaths . . . . .		...		
Diarrhoea—				
Admissions . . . . .	17·30	7·50	12·70	2·00
Deaths . . . . .		...		
Influenza—				
Admissions . . . . .	31·00	14·30	3·20	23·70
Deaths . . . . .		...		
Pneumonia (lobar and lobular)—				
Admissions . . . . .	17·30	8·60	13·40	8·70
Deaths . . . . .		...	2·04	1·35
Veneral diseases—				
Admissions . . . . .	8·40	4·90	10·20	5·60
Deaths . . . . .		...		
Minor septic diseases—				
Admissions . . . . .	23·50	33·30	22·70	16·20
Deaths . . . . .				
Local injuries—				
Admissions . . . . .	25·30	27·30	45·90	37·40
Deaths . . . . .	0·44	0·78	0·23	0·14
Heat-stroke—				
Admissions . . . . .				
Deaths . . . . .				
Heat-exhaustion—				
Admissions . . . . .				
Deaths . . . . .				
Ankylostomiasis—				
Admissions . . . . .	5·30	3·60	2·00	11·40
Deaths . . . . .				
Pulmonary tuberculosis—				
Admissions . . . . .	5·80	0·50	2·30	1·10
Deaths . . . . .	0·44	0·26	0·23	0·27

Strength over 2,000.

Wana.	Jhansi.	Dehra Dun.	Lahore.	Amhala.	ALL INDIA.	Razmak.
3,346	2,349	2,217	2,329	2,453	121,013	4,796
566.90 2.99	586.00 1.28	501.10 2.26	[ 469.70 6.01	459.40 2.45	432.00 2.52	401.60 3.13
14.98	17.90	18.81	20.06	15.59	15.68	17.47
347.30 ...	244.40 ...	245.40 ...	110.80 0.43	146.40 0.41	145.00 0.10	95.30 ...
9.90 ...	...	...	8.60 ...	13.50 ...	15.20 ...	...
0.60 ...	3.50 0.43	1.40 ...	3.80 0.86	2.40 ...	2.20 0.14	1.20 ...
14.70 ...	7.30 ...	9.90 ...	17.60 ...	24.50 ...	15.70 0.03	12.00 ...
... ...	3.80 ...	2.30 ...	5.20 ...	1.60 ...	6.10 ...	3.80 ...
14.30 ...	0.40 ...	... ...	70.40 0.43	1.20 ...	10.20 0.01	8.80 ...
6.90 0.30	4.30 0.43	7.70 0.45	12.90 1.70	8.20 0.41	7.80 0.80	9.00 1.04
2.70 ...	20.40 ...	11.70 ...	9.90 ...	6.10 ...	10.60 0.01	5.40 ...
14.30 ...	51.50 ...	39.70 ...	45.50 0.43	40.40 0.41	30.40 0.04	27.30 0.21
37.40 0.90	53.20 ...	46.50 ...	54.10 ...	48.10 ...	48.70 0.35	41.70 0.42
... ...	... ...	... ...	... ...	... ...	... 0.01	... ...
1.50 ...	... ...	... ...	... ...	... ...	0.10 ...	... ...
2.70 ...	6.80 ...	3.60 ...	5.60 ...	2.40 ...	4.60 0.01	13.60 ...
1.50 ...	2.60 ...	2.70 ...	6.00 0.43	1.20 ...	2.10 0.13	1.50 ...

TABLE

Stations with

STATIONS.	Bannu.	Fort Sandeman.	Peshawar.	Kohat.
Strength . . . . .	2,019	2,139	4,992	3,739
All causes—	755.30	737.70	644.40	588.70
Admissions . . . . .	1.49	4.67	3.00	1.87
Deaths . . . . .	23.29	15.39	24.63	19.79
Average constantly sick . . . . .				
Malaria—	396.20	461.40	218.30	277.90
Admissions . . . . .	0.50	...	0.20	0.27
Deaths . . . . .	...	...	...	...
Sandfly fever—	73.80	40.20	101.20	32.60
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Enteric group of fevers—	4.00	0.50	2.20	4.50
Admissions . . . . .	...	...	0.20	...
Deaths . . . . .	...	...	...	...
Dysentery—	13.40	6.10	28.60	16.10
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Diarrhoea—	6.40	32.70	3.80	5.60
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Influenza—	8.90	1.90	11.20	0.30
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Pneumonia (lobar and lobular)—	4.50	8.40	10.40	8.00
Admissions . . . . .	...	1.87	1.00	0.80
Deaths . . . . .	...	...	...	...
Venereal diseases—	3.50	3.30	13.60	4.50
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Minor septic diseases—	50.50	22.40	35.30	24.10
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Local injuries—	54.00	38.30	51.70	49.50
Admissions . . . . .	...	1.40	0.20	0.53
Deaths . . . . .	...	...	...	...
Heat-stroke—	...	...	...	...
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Heat-exhaustion—	...	...	0.60	...
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Ankylostomiasis—	6.40	9.80	2.20	6.20
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...
Pulmonary tuberculosis—	7.40	1.40	...	1.30
Admissions . . . . .	...	...	...	...
Deaths . . . . .	...	...	...	...

There is a fall in the invaliding rate.  
The principal causes of invaliding were:—

TABLE F.

Diseases.	Actuals.	Ratio per 1,000.	Increase + or decrease — as compared with 1931.	
			Increase.	Decrease.
Pulmonary tuberculosis . . . . .	251	2·07	..	—0·40
Injuries . . . . .	107	0·88	..	—0·22
Diseases of the eye . . . . .	52	0·43	..	—0·20
Diseases of the nervous system . . . . .	51	0·42	+0·01	..
Respiratory diseases (other than pneumonia and pulmonary tuberculosis).	44	0·37	..	—0·16
Organs of locomotion . . . . .	39	0·32	..	—0·27
Diseases of ear and nose . . . . .	31	0·26	..	—0·39
Circulatory diseases . . . . .	31	0·26	..	—0·14
Other tubercular diseases . . . . .	25	0·21	..	—0·27
Mental diseases . . . . .	21	0·17	..	—0·07
Digestive diseases . . . . .	19	0·16	..	—0·11
Venereal diseases . . . . .	15	0·12	..	..
Diseases of urinary system . . . . .	10	0·08	..	..
Malaria . . . . .	8	0·07	..	—0·01
Teeth and gums . . . . .	8	0·07	+0·01	..

The average number constantly sick in hospital was 1902·33 or 15·72 per 1,000 of the strength, compared with 16·89 in 1931.

The average sick time to each soldier was 5·75 days, and the average duration of each case 13·38 days; the corresponding figures were 6·16 and 13·66 in 1931.

144,460 men, or 1193·8 per 1,000 of the strength, were treated as out-patients compared with 1215·0 per 1,000 in 1931. The average daily number under treatment in barracks was 1883·08 or 15·56 per 1,000 compared with 14·07 per 1,000 in 1931.

The combined ratio constantly sick in hospital and under treatment as out-patients was 31·28 per 1,000 of the strength, compared with 30·96 in 1931.

The above represents a loss of 696,253 men days in hospital and 689,207 men days treated in barracks or a total loss of 1,385,460 men days in the year.



TABLE D—*contd.*

	Actuals.	Ratio per 1,000.	Increase + or decrease — as compared with 1931.	
			Increase.	Decrease.
Conjunctivitis . . . . .	744	6.1	+0.1	..
Scabies . . . . .	610	5.0	+0.8	..
Ankylostomiasis . . . . .	560	4.6	+0.4	..
Jaundice . . . . .	449	3.7	+0.4	..
Synovitis . . . . .	430	3.6	+0.4	..
Indigestion . . . . .	409	3.4	..	—1.2
Constipation . . . . .	402	3.3	+0.3	..
Mumps . . . . .	289	2.4	..	—5.1
Dermatitis . . . . .	279	2.3	+0.3	..
Otitis media . . . . .	271	2.2	..	—0.9
Enteric group of fevers . . . . .	256	2.1	..	—0.4
Piles . . . . .	255	2.1	..	..
Eczema . . . . .	252	2.1	..	—0.1
Pulmonary tuberculosis . . . . .	251	2.1	..	—0.5
Ring worm . . . . .	249	2.1	+0.3	..
Myalgia . . . . .	232	1.9	+0.1	..
Pleurisy . . . . .	224	1.9	..	..
Trachoma . . . . .	215	1.8	..	..
Dengue . . . . .	141	1.2	..	—0.6

In this year, as compared with 1931, changes in the ratios are trifling. Mumps, bronchitis and malaria show the most notable decreases. Local injuries and influenza, showing an increase of 1.3 and 1.0 respectively, head the list of conditions showing higher figures than in 1931.

The death rate has fallen to 2.52 per 1,000, as compared with 2.96 in 1931, thus showing a decrease on the rate of 1931 of 0.44 per 1,000.

The main causes of deaths were:—

TABLE E.

Diseases.	Actuals.	Ratio per 1,000.	Increase + or decrease — as compared with 1931.	
			Increase.	Decrease.
Pneumonia (lobar and lobular) . . . . .	97	0.80	..	—0.26
Local injuries . . . . .	43	0.35	+0.06	..
Digestive diseases . . . . .	20	0.17	..	..
Enteric group of fevers . . . . .	17	0.14	..	—0.09
Pulmonary tuberculosis . . . . .	16	0.13	..	—0.06
Malaria . . . . .	12	0.10	..	..
Circulatory diseases . . . . .	12	0.10	+0.01	..
Nervous diseases . . . . .	10	0.08	..	..
Meningococcal infection . . . . .	9	0.07	..	..
Other tubercular diseases . . . . .	8	0.07	+0.04	..
General injuries . . . . .	8	0.07	..	—0.01
Suicides . . . . .	7	0.06	..	—0.04
Urinary diseases . . . . .	5	0.04	..	..
Plague . . . . .	5	0.04	+0.04	..
Diseases of lymphatic system . . . . .	4	0.03	+0.02	..
Poisons . . . . .	4	0.03	+0.02	..

The principal causes of sickness were:—

TABLE C.

Diseases.	Actuals.	Ratio per 1,000.	Increase + or decrease—as compared with 1931.	
			Increase.	Decrease.
Local injuries . . . . .	90	41.4	..	—14.8
Malaria . . . . .	72	33.1	..	—17.5
Minor septic diseases . . . . .	53	26.7	+ 6.44	..
Tonsillitis . . . . .	41	18.9	..	—6.4
Influenza . . . . .	37	17.0	+ 2.9	..
Organs of locomotion . . . . .	28	12.9	+ 3.2	..
Ear and nose . . . . .	27	12.4	+ 2.7	..
Dysentery . . . . .	26	12.0	..	—8.7
Diarrhoea . . . . .	25	11.5	+ 0.9	..
Sandfly fever . . . . .	22	10.1	..	—0.5
Appendicitis . . . . .	22	10.1	..	—1.4
Bronchitis . . . . .	21	9.6	+ 0.4	..
Liver diseases . . . . .	16	7.4	..	—1.3
Dyspepsia . . . . .	15	6.9	+ 0.9	..
Gastritis . . . . .	15	6.9	..	—0.5
Nervous diseases . . . . .	14	6.4	..	—1.0
Pharyngitis . . . . .	14	7.4	+ 2.3	..

There were 15 deaths of which five were due to injuries, four to respiratory diseases, and six to other diseases (encephalitis lethargica, rabies, tick typhus, neuritis, tropical abscess and circulatory diseases at one each).

### Soldiers.

27. 52,017 or 429.8 per 1,000 of the strength, were admitted to hospital, compared with 451.3 in 1931.

There is thus a decrease of 21.5 per 1,000 compared with the 1931 figures.

The principal causes of admissions to hospital were:—

TABLE D.

Diseases.	Actuals.	Ratio per 1,000.	Increase + or decrease — as compared with 1931.	
			Increase.	Decrease.
Malaria . . . . .	17,558	145.1		—4.3
Local injuries . . . . .	5,293	43.7	+ 1.3	..
Minor septic diseases . . . . .	3,677	30.4		—0.6
Pharyngitis . . . . .	2,187	18.1		—0.2
Dysentery . . . . .	2,020	16.7		..
Sandfly fever . . . . .	1,850	15.3		—1.0
Bronchitis . . . . .	1,605	13.3		—4.7
Veneral diseases . . . . .	1,314	10.9		—0.1
Influenza . . . . .	1,241	10.3	+ 1.0	..
Pneumonia (lobar and lobular) . . . . .	961	7.9		—0.8
Rhinitis . . . . .	884	7.3		—1.7
Diarrhoea . . . . .	773	6.4		—1.2
Tonsillitis . . . . .	744	6.1		—0.1

## SECTION II.

ON THE HEALTH OF THE INDIAN ARMY DURING  
1932.*From the Director, Medical Services in India.*

25. General health statistics of the Indian Army in India during the year 1932 are given in the table below:—

TABLE A.

	Average strength.	Admissions.		Deaths.		Invalids sent to United Kingdom.		Invalids discharged in India.		Average constantly sick.	
		No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.
Officers	2,175	700	321.8	15	6.90	26	11.93	...	...	24.86	11.20
Indian Ranks	121,013	52,017	429.8	305	2.52	...	...	783	6.47	1902.83	15.72
Followers	28,248	7,525	266.4	109	3.86	...	...	...	...	266.85	9.43
Others *	...	2,094	...	25	...	...	...	73	...	...	...

\* Includes Reservists, Indian Territorial Force, Royal Indian Marine, Indian States Forces, R. A. F., Civilians and Pensioners.

The health statistics of officers and Indian ranks for the quinquennial periods 1920-24 and 1925-29 with those for 1930, 1931 and 1932 are given separately in the following table for purposes of comparison.

TABLE B.

Period.	Ratio per 1,000.					
	Admissions.		Invalids.		Deaths.	
	King's Commissioned Officers.	Indian ranks.	King's Commissioned Officers.	Indian ranks.	King's Commissioned Officers.	Indian ranks.
1920-24	698.3	593.2	3.65	18.25	6.67	8.01
1925-29	498.0	385.6	5.22	10.80	4.74	3.48
1930	313.7	417.9	16.42	6.23	5.47	3.16
1931	367.4	451.3	14.73	8.73	5.52	2.96
1932	321.8	422.8	11.95	6.47	6.90	2.52

**Officers.**

26. The admission rate of officers sick in hospital for 1932 is 321.8 per 1,000 of strength as compared with 367.4 in 1931.

No. Z.-9295/30 (D.M.S.-3), dated the 27th April 1933.

Experience which has accumulated since the inclusion of plasmoquine in the list of drugs authorised for use in British and Indian Military Hospitals has amply proved the value of this drug in the prevention of relapses in Benign Tertian Malaria. These good results (confirmed by a careful follow-up of treated cases) have been obtained by using the system of dosage detailed in the above quoted circulars—*viz.*, quinine grs. 20 *plus* plasmoquine grms. 0.03 for 21 days. In the ordinary course of events patients have been treated in hospital for 8 days, and have been excused duty and attended for treatment for the remaining 13 days—these periods of course being subject to variation in individual cases.

It is noted that in certain cases this course of treatment is being considerably modified as a routine measure (chiefly by reducing the duration of the treatment and the quantity of drugs) and frequently this is being done by officers who have no extensive experience of the treatment of malaria. Further, there is evidence that the results which are being obtained do not justify the altered treatment.

It has therefore been decided that the course of treatment detailed above will be employed as routine in the treatment of Benign Tertian Malaria except as follows:—

- (1) Where from the individual circumstances of the case special treatment is indicated. This point needs no elaboration.
- (2) Where an individual officer wishes to investigate in a scientific fashion a variation of this standard treatment. Sanction to carry out such an investigation will be obtained from these Headquarters and will be granted only on the condition that an accurate follow-up of all patients is kept and a report of the results submitted at the end of the next "relapse" season, *i.e.*, June of the following year.

As regards Malignant Tertian malaria, as pointed out in the second of the above quoted circulars, plasmoquine has little or no action on the asexual cycle of *P. falciparum*. Treatment will therefore be by quinine as the case indicates, with a course of plasmoquine during convalescence to destroy gametocytes (0.03 grm. for 4 or 5 days). If necessary (*i.e.*, if crescents are still to be found in thick smears) a repeat course of plasmoquine may be given a fortnight later.

These instructions do not refer to the selected hospitals which are using the Atebrin-plasmoquine treatment.

Malignant malaria should therefore be treated by quinine primarily, but during convalescence a short course of plasmoquine of 4-5 days duration, possibly repeated after an interval of 14 days or so, should be employed in addition to the usual quinine treatment.

No. Z.-10453/4 (D.M.S.-3), dated the 13th August 1932.

Various observers report that Atebrin in the dosage recommended below is at least as effective as quinine in controlling the symptoms of the attack of both benign and subtertian malaria. The gametocytes however are not affected but the results available to date suggest that recurrences are prevented.

Two treatments are under trial of 5 and 7 days' duration respectively followed in each case by a 5 days course of 0.02 grm. of plasmoquine per diem, the plasmoquine should be given during convalescence and there is no known reason why the administration of the two drugs should not overlap. It is suggested that alternate cases of proved malaria, *i.e.*, B. T. or M. T. be placed under treatment as follows:—

No. 1 Atebrin 0.1 grm. t.d.s. for 5 days followed by plasmoquine 0.02 grm. daily for 5 days.

No. 2 Atebrin 0.1 grm. t.d.s. for 7 days followed by plasmoquine 0.02 grm. daily for 5 days.

As the duration of a patient's stay in hospital has some effect on the occurrence of relapses, it is advisable to retain cases in hospital as far as possible for the same periods.

If for any reason it has been found necessary to administer additional specific treatment, *i.e.*, quinine, etc., a note to that effect will be made in the column of remarks of the nominal roll of cases.

No. Z.-10453/8 (D.M.S.-3), dated the 7th April 1933.

A further supply of Atebrin has been forwarded to certain selected hospitals for use in continuation of the investigation initiated in the middle of August 1932.

The principal object of this investigation is to determine the value of Atebrin-plasmoquine treatment in preventing relapses. Its value in cutting short the febrile attack in the vast majority of cases of malaria is an established fact. Attention is therefore drawn to the necessity for maintaining accurately on the prescribed *pro forma* the details of cases treated. The *pro formas* are to be completed on 30th June 1933 and forwarded to this office.

From July 1st the treatment will be varied by increasing the dose of plasmoquine from 0.02 grm. daily for 5 days to 0.03 grm. daily for 5 days. Otherwise the same system of treatment will be adopted. Fresh nominal rolls by units will be commenced from that date.

This is by no means absolute, but it is a very good working rule, and any cases of *M. T.* reported between April to June inclusive (especially fresh cases) should be scrutinised with the greatest care to ensure that the diagnosis is correct.

There is little difficulty in differentiating between a fresh case and a relapse. In the latter, using the thick smear method which is *par excellence* the technique for discovering "crescents", these characteristic structures can as a rule be found without fail. If they occur within a few days of the beginning of an attack, this can safely be labelled a relapse. If they are not found, although *M. T.* rings are present, there is little doubt that it is a fresh infection.

The fallacy of the mixed infection (a common occurrence in certain localities) should be borne in mind. In the early stages of such a case the ring-forms of *P. falciparum* are liable to dominate the picture to the exclusion of the less numerous *P. vivax* trophozoites. Treatment is given which proves sufficient to kill the former infection, but not the latter. In due course a relapse occurs, and examination of a blood smear shows the presence of *P. vivax*. So common was this during the war among troops in the Near East, that a number of French malariologists became quite convinced that there was only one malaria parasite, capable of appearing in either the *P. falciparum* or the *P. vivax* form.

The characters and numbers of the parasite in such a relapse will usually make clear the real state of affairs.

It is requested that the questions raised in this circular should be carefully considered by all concerned: that the general principles should be carefully weighed in relation to all cases which occur: and that exceptions to these principles which are of sufficient importance should be the subject of special investigation and report.

### ANNEXURE III.

*Excerpts from various recent Army Headquarters circulars regarding the new synthetic anti-malaria drugs.*

No. Z.-9295/28 (D.M.S.-3), dated the 9th July 1932.

Plasmoquine is now included in the list of drugs authorised for use in British and Indian military hospitals. It is as well therefore to review its action on the different phases of the parasites of benign tertian and malignant tertian.

Plasmoquine acts on the merozoites and schizonts of *P. vivax* but in the trials carried out in the Army in India this action has been found to be greatly enhanced by the exhibition of quinine. A combination of 0.03 grams, plasmoquine *plus* 20 grs. quinine daily for 21 days has been found effective as a cure, and much more effective in preventing relapses than quinine alone. This dosage apparently produces no toxic effects. The drug also acts powerfully on the gametocytes of *P. vivax*.

In malignant tertian malaria plasmoquine has very little action on the merozoites and schizonts of *P. falciparum* but quite small doses are sufficient to destroy the gametocytes.

diurnal temperature, and it may be some days before the typical tertian nature of the fever declares itself. On the other hand, a relapse is usually of dramatic suddenness, and the classical symptoms are present from the beginning while a fever of the first kind is of good positive value in labelling the attack primary, it cannot be said that every fresh benign tertian case begins thus: hence its absence is of less import. This type of fever, too, is less likely to occur in a reinfection, where the presence of such a sign would be of particular value.

(c) The blood smear.

Much information as to the nature of the attack can be gained from this.

In a true fresh attack parasites are usually very scanty and (in the early stages) require to be searched for very carefully. The forms which are seen are rings or developing trophozoites up to the schizont stage, depending on the time, in relation to the rigor, at which the smear was taken. Mature gametocytes (*i.e.*, gametocytes larger than a normal red cell) will not be found. This of course does not hold good after the 7th day of the fever, by which time gametocytes may have appeared.

In a relapse case, not only will parasites usually be found to be numerous, but gametocytes can be discovered without difficulty in most cases. The position is not so clear if the patient has taken quinine before the blood slide was made, as quinine very quickly drives the parasites from the peripheral circulation. On the other hand the very fact that quinine has been taken, labels the patient an "old stager" and therefore probably a relapse.

As regards examining blood smears for gametocytes, there are two matters of importance.

The first is that the parasites will be discovered much more quickly and with greater certainty in a "thick" smear, provided the microscopist has a little experience of this method. A negative result from a thick smear (examined by a competent observer) is a good negative. The method is strongly recommended. The trouble expended in mastering the technique will amply repay itself in a very short time.

Second, if a thin smear be used it is a waste of time to look anywhere except along the extreme margin of the smear. Manipulate the stage so that the cells which form the boundary of the smear move across the field. As is well known polymorph leucocytes tend to collect at the edge. The globular gametocytes, and swollen red cells containing trophozoites, have the same tendency and will be discovered much more readily here than anywhere else in the smear.

(d) The prevalence or otherwise of carrier mosquitoes has its significance. An odd mosquito may give rise to an odd case. It is highly improbable that a series of fresh cases will occur where there are no obvious mosquitoes to account for them.

*Malignant Tertian* malaria shows much less tendency to relapse than *Benign Tertian*.

Infection is usually acquired in the months of August to November inclusive, although cases both before and after this period are liable to occur in certain districts. Relapses of *M. T.* cases may occur until February or March of the following year, after which in treated cases the infection usually disappears.

first fresh case of Benign Tertian appeared in the new division. Once started, the cases poured in from this as from the old divisions. A month later, about the middle of July, Malignant Tertian appeared, and increased rapidly in volume.

It can be accepted with considerable certainty, therefore, that in this particular locality the season of primary incidence begins towards the latter end of June.

There is, however, another phase in cycle of incidence which must be emphasised. Benign Tertian malaria was known to the old school of European malariologists as "Spring Fever", a name which seems to contradict the statement made above, that primary cases do not occur until the end of June. The explanation is a simple one. In the spring months of 1817 and 1918 such an outbreak occurred, and the Salonika hospitals were flooded with Benign Tertian cases. These were, however (as shown by the control afforded by the fresh division and also by their blood smears) *relapse* cases. From a study of the literature of the days when treatment was less accessible and less efficacious than it is now, it would appear that the spring outbreak was a regular feature. It represents a very important phase in the bionomics of the parasite—an arrangement ensuring infection of the new season's mosquitoes, and a carry over from one year to another. In Salonika the spring cases were partly relapses of known cases and partly first attacks occurring in men who, because of routine dosing with quinine as a "prophylactic" measure, had weathered the previous season without overt symptoms, although they had actually acquired infection.

Salonika has been cited because we possess controlled statistics regarding the state of affairs which obtained there. As the meteorological conditions in India not only differ from those in Southern Europe, but also differ in one part of the country from another, it is not for a moment suggested that the dates which have just been given are valid for India. Nevertheless, there is every reason to believe that the general principles hold good, and that it ought to be possible to work out for each station a definite period, probably extending from the beginning of the cold weather to the beginning of the rains, in which cases of "fresh" malaria are unlikely to occur. This applies particularly in the case of soldiers living in roomy, well ventilated barracks where hibernating mosquitoes are rare. This statement does not imply that fresh malaria *cannot* occur at this time. It does, however, impose on the clinician the necessity for exercising great care in excluding the possibility of previous infection before labelling such cases "fresh".

The study of this point is commended to Deputy Assistant Directors of Hygiene. It is one of real importance and interest. From time to time excellent controls will be provided by battalions arriving fresh from home in the latter part of the trooping season.

As a general principle, therefore, cases occurring in the second half of the year may be either fresh cases or relapses (the exclusion of reinfection during these months will always be a very difficult problem) while those occurring in the first half are more likely to be relapses. Invariably, the individual circumstances of the case and of the locality must be carefully and critically considered, before coming to a decision.

(b) The type of fever may be of assistance in arriving at a conclusion. A true primary case frequently shows, at first, an irregular and indefinite



"relapse" more or less according to fancy, the clinician having a bias to the former and the epidemiologist to the latter.

No definite ruling on the subject has been given by these headquarters, as it is felt that no arbitrary rule is capable of meeting every case. As, however, questions on the subject are frequently raised, it is thought that the enunciation of a few guiding principles might be of help.

The problem varies with the type of malaria from which the patient is suffering.

*Quartan* malaria may be dismissed in a few words. It is so rare that any patient who develops a second attack thereof may with safety be regarded as a relapse. The chances of one individual being twice separately infected with this parasite are so remote as to be negligible. (These remarks apply, of course, to India.)

*Benign Tertian* malaria, with its notable tendency to relapse, presents the most difficult problem.

As a rule there is little difficulty regarding a first attack of malaria, which can be labelled "fresh". Yet it must not be forgotten that delayed primary attacks are of very common occurrence where "prophylactic" quinine (or plasmoquine) has been used. This was amply evidenced during the war, where many (owing to the action of prophylactic quinine) remained apparently quite free from fever while in a malarious country only to develop a typical attack at varying periods after their return home. Primary attacks which occur "out of season" should be carefully scrutinised to eliminate a cause such as this.

In deciding on the nature of a second or subsequent attack, the following considerations must be carefully weighed.

(a) The time of year.

This important matter usually receives less attention than it merits.

The development and the habits of the mosquito, the development of the parasite in the mosquito, and, according to recent work, even the power of an infected mosquito to transmit infection, are governed by factors which are in the main related to atmospheric conditions such as temperature and humidity. These conditions, lasting over sufficiently long periods to be of practical importance, are for any given locality of comparatively regular seasonal incidence.

In Europe during the war it was possible to make controlled observations on this point. The bulk of our army landed in Salonika late in 1915. It remained, to all intents and purposes, free from malaria until the latter part of June 1916, when frequent cases began to occur, at first Benign Tertian, later Malignant Tertian. In December 1916 there arrived a new division, which, but for an occasional old soldier here and there, had never served in a malarious country. This division was placed beside, and under identical conditions to, the divisions which had served during the previous year. Owing to a "bottle-neck" in the lines of communication, it was possible to keep a very careful watch on the cases occurring in this new division, and in one of the old divisions. From March onwards numerous cases occurred in the old division, but it was not until the middle of June (although for several weeks previous to this mosquitoes were numerous and conditions seemed ideal), that the

## ANNEXURE II.

No. Z.-12050/1 (D.M.S.-3).

ARMY HEADQUARTERS, INDIA,

MEDICAL DIRECTORATE.

Simla, the 10th June 1933.

To

THE DEPUTY DIRECTORS OF MEDICAL SERVICES OF  
COMMANDS.THE ASSISTANT DIRECTORS OF MEDICAL SERVICES OF  
DISTRICTS AND INDEPENDENT BRIGADE AREAS.*(With copies for Distribution to all Hospitals, and all Officers of the  
R. A. M. C. and I. M. S. in Military Employ.)*SUBJECT:—*The differential diagnosis of Malaria.*

A perusal of the Annual Reports of Medical Transactions of hospitals, and of the Annual Reports of Specialist Hygiene Officers once more shows the great difficulty which many officers have in distinguishing between "fresh" and "relapse" malaria.

The attached communication on this subject is sent out in the hope that it may mitigate the difficulty, and provide more or less standardised principles in the differential diagnosis of this disease.

2. A reserve stock of this circular is being maintained at these Headquarters, and further copies may be indented for as and when required for issue to newly arrived officers of the R. A. M. C. and I. M. S.

W. H. S. NICKERSON,

*Major-General,**Director of Medical Services in India.*

[Enclosure to D. M. S. Circular No. Z.-12050/1 (D.M.S.-3), dated the  
10th June 1933.]

*The differential Diagnosis of fresh and relapse Malaria.*

It is a matter of no small importance, both to the clinician and to the epidemiologist, to determine whether a patient suffering from malaria is the victim of a fresh attack, or of a relapse: to the clinician so that he may gauge the efficacy of his treatment: to the epidemiologist that he may more accurately control his anti-malaria measures.

From time to time an arbitrary "time limit" has been fixed as the guiding principle, so that an attack occurring say more than six months, after a previous one was automatically regarded as a fresh infection, while one occurring within six months was called a relapse. The fallacies of this rule were freely admitted by those who sponsored it, but it was considered to be the lesser of the two evils, and to provide more satisfactory figures than the indiscriminate labelling of cases "fresh" or

- (b) *Its effect on the man.*—Natural resistance is lowered while in addition humidity causes a condition of mild acidosis in which the malarial parasite develops more rapidly.
- (c) *Its effect on the parasite.*—A greater number of sexual forms than normal is produced in the blood under humid conditions, with consequently increased possibilities of infection of mosquitoes.

# A SUMMARY OF CONCLUSIONS COME TO IN REGARD TO THE RELATIONS BETWEEN METEOROLOGICAL CONDITIONS AND MALARIA INCIDENCE AMONG BRITISH TROOPS.

1. Humidity is the most important factor influencing the incidence of malaria amongst troops in the non-monsoon area of the North-West Frontier Province, and the other factors combined, which must play their part, do not in the large majority of years exert a sufficient influence to detract materially from the value of the study of humidity as a guide to malaria incidence.

2. It is during a very limited period of the year that the humidity factor is of importance.

3. Bad malaria years are characterised by the occurrence of one or more ten-day periods with an average humidity of over 80 per cent., and with the maximum average readings for such periods falling between that commencing on July 29th and that ending on August 28th each year.

Good years are characterised by the absence of ten-day periods showing an average humidity of over 80 per cent. and by those periods in respect of which the average humidity is between 76 and 80 per cent. not occurring prior to the ten days ending on August 28th annually.

4. All those years with the higher incidences of malaria are characterised by one or more ten-day periods with average humidities of more than 75 per cent. in or before that ending on August 18th; the remainder with the lower incidences are not so characterised.

5. By the above means, we are in a reasonably satisfactory position as regards predicting bad years among troops in non-monsoon area of the North-West Frontier Province and possibly work in other places might show much the same state of affairs in monsoon areas and in other parts of India.

6. The dry bulb temperature does not on the whole exert any great influence on the incidence of malaria, possibly because, under the particular conditions existent in the North-West Frontier Province there is no very great variation in the different years during the critical period.

In other parts of India, this factor is probably of greater account and would need more consideration.

7. The method of predicting malaria incidence suggested is not absolutely accurate, and further study in future years of the factors involved is required, in order to evolve a still more efficacious means of forecasting if possible.

## ANNEXURE I.

*The relation of malaria incidence to meteorological conditions.*

It was mentioned in the last annual hygiene report that after a study of the malaria incidence among British troops in Peshawar during a period of seventeen years and of the meteorological conditions throughout a similar period, it was clear that humidity during a limited portion of the mosquito season was the chief factor involved each year.

Details in regard to this are embodied in the summary which follows.

It is interesting to examine in the light of these findings, the malarial history of the year under review.

A reference to the appendix mentioned and in particular to paragraph 3 will indicate that our experience is that good years are characterised by the absence of ten-day periods showing an average humidity of over 80 per cent. and by those ten-day periods in respect of which the average humidity is between 76 and 80 per cent., not occurring prior to the ten days ending on August 28th annually.

In point of fact as far as 1932 is concerned there was no ten-day period with a humidity of over 80 per cent. but there was one such period which produced an average reading of between 76 and 80 per cent., and it occurred prior to August 28th.

Although conditions were not attained which should have produced a bad malarial year, it must be admitted that according to our findings the one ten-day period (ending August 8th) with an average humidity of approximately 80 per cent. that occurred should have partially stripped the year of the halo of sanctity it actually achieved as regards malaria incidence, and the year, although it should have been a good one should not have been the excellent one it actually was.

Examination of the humidity chart may reveal the reason for this if the issue of prophylactic quinine was not the cause, and shows that in contradistinction to all other years the humidity after reaching its maximum (at the 10-day period ending August 8th) dropped *very rapidly indeed*.

Of all the other 17 years, the meteorological conditions of which have been examined, none exhibited this feature, and the drop in the humidity after attainment of the peak was always very much more gradual.

It should be mentioned that there was a good deal of rain between July 9th and August 18th, and our contention that it is humidity and not rainfall which governs malaria incidence in this part of the world received therefore still further support.

The reasons on account of which humidity influences malaria incidence so much are strongly suspected to be:—

- (a) *Its effect on the mosquito.*—The insect becomes more voracious and feeds more frequently in humid weather.

The malarial parasite also develops more certainly and more quickly in the mosquito under such conditions.

TABLE 26.

*Comparative summary of dental treatment carried out during the year 1932, for British Other Ranks in India (including Royal Air Force).*

Year.	No. inspected	Selected men	No. for whom treatment was completed.	No. unsatisfied	No. of teeth conserved, incl. root treatment	Temp. amp.	Treatment for gingivitis, stomatitis and pyorrhoea.	Artificial dentures	Remodelled appliances	Appliances supplied for jaw injuries.
	18,361	13,650	14,879	13,964	32,486*	5,680	758	770	388	29
1931	19,820	13,835	17,294	15,157	37,912†		825	599	571	46

\* Includes 388 with root treatment.

† Includes 493 with root treatment.

TABLE 27.

*Analysis of summary of dental treatment carried out during the year 1932, for British Other Ranks in India (including Royal Air Force).*

	1932.	1931	Increase.	Decrease.
Number of men for whom treatment was completed.	14,879	17,294	..	2,415
Percentage of men inspected found to require treatment.	74%	69%	5%	..
Average number of teeth conserved per man.	2.20	2.20	..	..
Average number of teeth extracted per man.	0.94	0.88	..	0.6
Treatment for gingivitis, stomatitis and pyorrhoea.	758	825	..	67
Percentage of men treated supplied with artificial dentures.	5.1%	3.40%	1.70%	..
Number of dentures remodelled and repaired.	388	571	..	483
Appliances for fractured mandible and maxilla.	29	46	..	17

TABLE 28.

*Comparative Summary of Dental Treatment carried out during the year 1932, for the families of British Other Ranks (including Royal Air Force).*

	1932.	1931.
Number of teeth conserved . . . . .	3,434	3,016
Number of teeth extracted . . . . .	4,034	3,571
Scalings . . . . .	600	311
Treatment for gingivitis, stomatitis and pyorrhoea . . . . .	136	114

*Dysentery*.—All laboratories are co-operating in a scheme which aims at effecting the final classification of atypical dysentery bacilli. Of the mannite-fermenting group, the remaining undefined non-saccharose fermentors are being investigated at the Enteric Laboratory, Kasauli, and the Saccharose fermentors at the District Laboratory, Meerut. At the District Laboratory, Quetta, the non-mannite fermenting group is under review, as are certain problems relating to amœbic dysentery.

*Sandfly fever*.—Work designed to throw light on the etiology of sandfly fever has been carried on at Peshawar. This research is still in progress, and will be the subject of a report at a later date.

*Vitamins*.—Investigations into the vitamins content of the expressed juices of various types of germinated pulse have been made in the District Laboratory, Calcutta. Although rich in vitamins, germinated pulse when raw is unpalatable and indigestible and when cooked loses much of its anti-scorbutic value.

The expressed raw juice is rich in vitamins and when sweetened and flavoured with citric acid and oil of lemon forms a palatable drink. This method promises to provide an inexpensive easily carried and convenient antiscorbutic for use in the field under special circumstances.

*Kahn reaction*.—Continued observations on this test are being made in the Southern Command Laboratory, Poona. When its technique is sufficiently perfected it is hoped that the Kahn test may replace the more elaborate and more cumbersome Wassermann reaction.

*Plague*.—In Bangalore (Madras District) an epidemic of plague occurred among the civil population, there being only two military cases. At the same time it was noted that the striped grey squirrels (tree rats) died off in considerable numbers. *B. pestis* was recovered from eight of these out of a total of 18 which were examined. Organisms morphologically resembling *B. pestis* were also seen in smears made from crushed fleas caught on these animals.

*"Tick" typhus*.—Investigations relating to the problems of the vector, the reservoir of infection, and the serological diagnosis of this condition are in progress at the Deccan District Laboratory.

### Dental Treatment in India for the year 1932.

24. During the year the establishment of The Army Dental Corps in India had to be reduced by 3 officers and 3 clerk-orderlies bringing the strength to 23 officers [which includes one administrative officer with executive duties in addition, A. D. M. S. (D. S.) Rawalpindi], 16 dental mechanics and 23 clerk-orderlies.

The following comparative tables are given:—

Dental treatment carried out for British Other Ranks, including R. A. F.

Dental treatment carried out for families of British Other Ranks, including R. A. F.

Analysis of dental treatment carried out for British Other Ranks, including R. A. F.

*Disinfection and Disinfestation.*—The advance of mechanisation in the army, coupled with the road conditions in India, has impelled the authorities concerned to abandon the Foden lorry-disinfector as a field unit; it is too heavy, slow and unwieldy for modern conditions in this country. It is hoped that unit disinfection—disinfestation may be introduced for the field army before long; and, to this end, experiments with several kinds of portable disinfectors are now in progress.

An improved pattern of spray bath is also under consideration for field use.

*Conservancy.*—During 1932, and especially in the Northern Command, the construction of small, self-contained septic tank installations has been extended. These constructed in 1931 have, so far, given little or no trouble; and it appears as if this system is likely to become more and more popular as time goes on. The significance and potential importance of this innovation will be appreciated by all who have served in India in the past.

In some of the frontier stations the disposal of manure continues to be a matter of anxiety; but, at Razmak, the problem now appears to be well on the way to a final and satisfactory solution.

Generally speaking, the disposal of waste (sullage) water is still far from efficient. Grease traps and soakage pits continue to be constructed and improved; but it is doubtful if this defect in Indian military sanitation will ever be adequately and permanently overcome in the absence of water-borne systems of sewage disposal.

*Mother and Child Welfare.*—Up to the Autumn of 1931 this work was carried on under the auspices of the Lady Birdwood Army Child Welfare Committee. Thereafter, and consonant with the abolishment of this committee, the work has been pursued under the direction and control of the Maternity and Child Welfare Bureau of the Indian Red Cross Society, the Director of which (Dr. Ruth Young, M.B.E.), has afforded the army's centres much valuable assistance and advice.

The work done at the centres at Quetta and Lahore is worthy of special mention.

### Pathology.

23. On the reorganisation of Southern Command, the District Laboratory at Mhow has become a Brigade Laboratory. The old site in the Section Hospital has been vacated, and a new and specially designed set of rooms in the Station Hospital occupied. The result is a vast improvement.

Only minor additions to, and replacements of equipment have been made during the year.

The greater part of the work of the laboratories is of a routine nature, and much of this has already been detailed in the previous sections. Increasing use is being made of the facilities afforded by the laboratories to elucidate diagnosis and control treatment.

There are no specially funded researches, but in several laboratories investigations are being carried on with the ordinary resources at their disposal. The following are the principal of these.

*Rations.*—This subject continues to receive attention, both from the standpoint of peace and of war.

Late dinner for British troops serving in the plains in the hot weather has many advocates; but it is an idea foreign to the upbringing and habits of the British soldier; and it has not, so far, been adopted generally or with much enthusiasm.

One specialist sanitary officer makes a strong plea for enforcing a special hot weather diet on British troops serving in the plains in the hot weather. He suggests the following ration:—

	<i>Calories.</i>
Bread 1 lb. . . . .	1314·040
Flour or rice $\frac{1}{2}$ lb. . . . .	406·900
Fresh meat, 8 ounces . . . .	344·000
Onions, 6 ounces . . . . .	82·000
Potatoes, 10 ounces . . . . .	360·000
Green vegetables, 12 ounces .	96·000
Dals, peas and beans, 2 ounces	198·000
Nuts, $\frac{1}{2}$ . . . . .	60·000
Dry fruits, 1 ounce . . . . .	53·000
Sugar, $2\frac{1}{2}$ ounces . . . . .	301·60
Salt, $\frac{1}{2}$ ounce . . . . .	
Tea, $\frac{2}{3}$ ounce . . . . .	

3215·540

Theoretically, this may be a sound hygienic proposition; but the British soldier possesses a psychological make-up which has to be studied and often humoured; and it cannot be taken for granted that the soldier would submit to being deprived of his pound of flesh without so much as a murmur. However, the specialist in question is of Indian extraction, and may therefore be forgiven an undue degree of optimism as regards the high degree of adaptability in the ranks of British troops.

The work at the Military Food Laboratory is summarised in the following table:—

TABLE 25.

Source of sample.	Number of samples received.	Accepted.	Rejected.	Percentage of rejections.
1. <i>On offer or for acceptance</i> —				
Direct from overseas . . . .	672	599	73	10·9
Indian products . . . . .	662	531	131	19·8
Grains from grain depots . . .	2,448	2,337	111	4·5
Wheat products from controlled mills.	605	605	..	..
Bran from other than controlled mills.	455	401	54	11·9
Ghi . . . . .	5,296	5,296	..	..
2. <i>From I. A. S. C. stocks for periodical analysis.</i>	1,921	1,875	46	2·4
3. <i>From units on complaint or for advice</i>	1,439	1,227	212	14·7



*Anti-chlorine taste paints.*—Experiments have been conducted with a view to finding suitable paint for interior of steel water tanks, which while preserving the metal from corrosion also produces no taste with chlorinated water, even when it is heated, *e.g.*, for making tea.

*Irrigation.*—Separate supplies have been provided for watering gardens, etc., at the following stations:—

*Under M. E. S. control.*

Ambala.  
Delhi Cantonment.  
Risalpur.  
Bolan Road.  
Rindli.  
Jullundur (K. G. R. I. M. School).

*Under control of Municipal, Cantonment or other authorities.*

Kohat.  
Lahore Cantonment.  
Peshawar Cantonment.  
D. I. Khan.  
Bannu.  
Quetta.  
Loralai.  
Fort Sandeman.  
Wellington.  
Mandalay.  
Cawnpore (H. and S. Factory).  
Dehra Dun.  
Delhi Fort.  
Barkhan.

Razmak (The supply of water for irrigation purposes is included in the scheme for supply of water for domestic purposes, but the supply has not yet been provided).

*Pipes.*—The use of asbestos cement pipes is expanding rapidly with consequent economy, less incrustation, less fouling with bacteria such as *Crenothrix*, and less corrosion effects due to the many acid soils existing in India.

*Plunge Baths.*—Plunge Baths (46' × 14') are authorised for all British Cavalry Regiments for instruction in swimming and are provided at stations where such facilities do not already exist. There are a considerable number of plunge baths in stations where British Troops lines exist, some in use and some not.

*Swimming Baths.*—The use and the maintenance of existing swimming baths in the lines of the British Troops is authorised. Swimming baths exist in many stations such as Secunderabad, Sialkot, Lucknow, Meerut, Jhansi, Cawnpore, Lahore Civil Lines and Delhi Fort, but facilities for bathing are lacking at a number of stations, notably Quetta. New swimming baths have been provided at Jubbulpore, Razmak, Fort William, Peshawar and Bannu. Purification of the water is still being carried out by antiquated methods (copper sulphate and bleach distributed at the end of the long pole).

*Water cooling.*—No progress has been made in provision of apparatus for cooling of drinking water, owing to financial stringency.

*Refrigerators.*—Experiments are in hand at two hospitals on the Frontier (Razmak and Wana) with small domestic refrigerators (one electric-driven and one self-contained) with a view to better preservation of food, drugs, etc., and to showing economy over purchase of ice.

(b) Work was continued on the following projects:—

Lahore.—Provision of a piped water supply to Base Supply  
Dépôt and Ordnance Base Dépôt.

Rawalpindi.—Improvements to water supply.

Nasirabad.—Improvements to water supply system (Preliminary exploration to determine quantity and location of available water).

(c) Work was completed on the following projects:—

Kasauli and Sanawar.—Improvements to piped water supply system.

Murree.—Construction of a new storage reservoir.

St. Thomas Mount.—Provision of a piped water supply system.

Delhi Fort.—Improvements to power and water supply.

Cawnpore.—Provision of piped water supply system.

Quetta.—Improvements to water supply.

*Future.*—The following stations will be taken in hand when funds permit:—

*New piped supplies.*

Campbellpore.  
Mallapuram.  
Jhansi.  
Ferozepore.  
Baroda.  
Kamptee.  
Jullundur.  
Fyzabad.  
Mardan.  
Multan.  
Calicut.  
Benares.  
Cannanore.  
Pachmarhi.  
Fatehgarh.  
Gorakhpore.  
Baragali.

*Improvements to existing piped supplies.*

Tangi.  
Cherat.  
Fort William.  
Shillong.  
Aurangabad.  
Saugor.  
Manzai.  
Agra.  
Dehra Dun.  
Calcutta (Hastings).  
Maymyo.  
Hangu.  
Jhelum.

The K. G. O. Bengal S. and M. Headquarters at Roorkee have provided a water supply for the troops at its own expense, the State paying for water supplied to the entitled consumers.

Other matters of interest:—

*Handbook.*—A handbook on Water Purification was issued by the M. E. S. early in 1932 which has proved invaluable both to the engineers and the medical authorities. As a result, there has been a great improvement both in the provision of suitable chlorinating and testing plant, in technique of chlorination, and in testing of the water before and after treatment. The use of chloramine has not yet developed. The respective responsibilities of the engineers and the medical authorities have been clearly defined.

Diseases of the Throat—	Attendances.
Hypertrophy Tonsils and Adenoids	128
Vincent's Angina . . . .	2
Pharyngitis . . . .	12
Laryngitis . . . .	11
N. A. D. . . . .	207

Total

### Hygiene.

22. *Accommodation.*—Minor alterations and improvements continue to be effected; but their diversity rather than their scope and importance calls for notice. Thus, re-conditioning and re-roofing were prominent items. So, too, were electrification and fly-proofing; and in one case (a dining hall) bird-proofing was carried out. Swimming baths were provided. Exhaust fans were installed in certain cook-houses. The perimeter wall of a Military Detention Barrack was raised; and, in an officers' mess, the openings between the bedrooms and bath rooms were closed.

*Water Supplies.*—The necessity for the improved means of the supply of water and still more the distribution thereof in cantonments as preventive of epidemics was advocated by Dr. Cunningham in 1869. Since then piped water supplies were provided in comparatively unhealthy large stations as funds permitted. In 1901, the Government of India authorised the provision of piped water supplies in cantonments as authorised works provided that it was limited to the following allowances for the whole population of the station concerned:—

	Gallons per head per diem.
<i>In plains—</i>	
Europeans . . . . .	20
Indians . . . . .	8
Animals . . . . .	10
<i>In hills—</i>	
Europeans . . . . .	15
Indians . . . . .	5
Animals . . . . .	10

The annual comparative statement of water supplies under the control of the M. E. S. gives a list of water supplies so far completed.

During 1932:—

(a) Work was started on the following projects:—

Lucknow.—Provision of tube well water supply.

Ranikhet.—Improvements to water supply.

Bangalore.—Provision of reservoirs for two days supply and connected improvements to the distribution system.

Regarding the contention that these are not cases of trachoma at all, but forms of chronic conjunctivitis; it is not possible to be dogmatic—for only experience can enable one to diagnose between early cases of trachoma, angular conjunctivitis and follicular conjunctivitis.

But in my opinion it is perfectly safe to accept recruits with mild trachoma; in fact, in some parts of India, especially in Sind, there are few eyes that do not show some signs of trachoma and yet give rise to no symptoms at all; and these signs are only found in apparently healthy eyes on everting the upper lids. If all recruits are rejected because they have some signs of mild trachoma, the field for recruiting will be enormously curtailed. Furthermore, in mild cases of trachoma at the age at which recruits are taken, the risk of infection is so small, as to be almost negligible.”

Good work has been done by the specialists in connection with their periodical visits to the King George's Royal Indian Military Schools.

Arrangements have been made to supply certain essential items of modern ophthalmic equipment to one eye specialist in each Command. These have been ordered from Home and should be available for distribution within a short time.

*Ear, Nose and Throat Departments.*—Substantial progress has been made with the re-equipment of these departments.

In illustration of the work done by these departments of which there are four—the following were the attendances made at the Connaught Military Hospital, Poona, during 1932:—

	Attendances.
<b>Diseases of the Ear—</b>	
Furunculosis . . . . .	32
Healed Perforations . . . . .	24
Mastoid Operations . . . . .	11
Nerve Deafness . . . . .	2
Tinnitus aurium . . . . .	10
Otitis Media. Suppurative . . . . .	222
Otitis Media. Catarrhal (Right) . . . . .	5
Otitis Media. Catarrhal (Left) . . . . .	4
Chronic Eczema . . . . .	12
Wax Removed . . . . .	40
<b>Diseases of the Nose—</b>	
Deviated Nasal Septum to right . . . . .	16
Deviated Nasal Septum to left . . . . .	15
Nasal Polypi left side . . . . .	7
Nasal Polypi right side . . . . .	2
Turbinate Congestion . . . . .	12
Frontal Sinusitis . . . . .	8
Suppurative Antra of Highmore (right) . . . . .	14
Suppurative Antra of Highmore (left) . . . . .	9
Epistaxis . . . . .	2
Fracture Nose . . . . .	1

A blow on the head, resulted in death from intra-cranial hæmorrhage (sub-dural). There was no injury to bone.

*Radiology.*—Summary of X-Ray examinations carried out during the year is given in Table 24.

TABLE 24.

No. of patients examined.	Number and nature of examinations carried out.	Cases in which a contrast medium was used and nature of medium.	Miscellaneous information (monthly and annual).
	Bones and Joints.		

221

The revised classification of X-ray installations and the extent to which they will be utilised is as follows:—

Class A.—Powerful immobile plants, suitable for all radiography, fluoroscopy and superficial therapy. Electro-therapy also to be authorised. Number 6.

Class B.—Movable medium-powered plants, suitable for ordinary radiography and fluoroscopy but not for therapy. Number 14.

Class B-2.—Same as Class B, but with fewer accessories, suitable for ordinary radiography and limited fluoroscopy; without screening stand. Number 10.

Class M.—Mobile self-contained units, fully equipped for service in the field. Number 2.

Of the 30 stationary plants, 26 are now fully re-equipped. Re-equipment of the remaining four will be completed by the end of the financial year 1934-35.

*Ophthalmology.*—The enlistment of recruits suffering from mild trachoma continues to give successful results. The opinions of recruiting medical officers are in conformity with that of a distinguished ophthalmologist in civil practice, who writes:—

“ I can speak from 33 years Indian experience and I am quite convinced that there are many mild cases of trachoma which are not only amenable to treatment, but which will eventually clear up without treatment. One sees hundreds of these cases each year.

extending from the lower margins of the ribs up to the scalp and down both arms to the elbows, had developed. The abdomen was slightly distended, but not rigid. The bowels moved twice, naturally and again by enema. The patient was in great distress; abdominal pain and vomiting; temperature and pulse normal. X-ray examination of the chest showed no injury to the ribs. On the fourth night after admission the patient collapsed. Abdominal pain and vomiting became urgent, and other signs and symptoms indicated intestinal obstruction. The patient was *in extremis*: too ill to stand operation. He died in the early morning. Post-mortem examination revealed strangulation of the small intestine by a band a few inches above the ileo-caecal valve. The small intestine was twisted here, and again near the duodenal-jejunal junction. The intervening gut was much damaged. The case is of interest because, although subcutaneous emphysema is known as a possible complication of post-peritoneal rupture of the colon, it must be a very rare result of damage to the small intestine.

Rammstedt's operation for the relief of infantile hypertrophic pyloric stenosis has been performed successfully in several of the hospitals.

Two surgeons record the good results obtained from the alkaline-urotrophin pre-operative treatment for cholecystectomy. In one case the gall bladder contained over 200 small stones.

The Lockhart-Mummery operation for prolapse of the rectum is recommended on account of its rapidity and simplicity.

In one station all men who had had excision of the internal semi-lunar cartilage performed on them were collected for examination. Fifteen were available, and their operation histories dated back four years. One man stated that his knee joint was inclined to swell after violent exercise. The remaining fourteen were in the enjoyment of full athletic activity. These results are put forward as a plea for early operation. If allowed to carry on indefinitely under palliative treatment "the ligaments of the joint become weakened, the muscles lose their tone and waste, and recovery after operation is a long and tedious business".

A case of arthritis of the knee joint, in which pneumococci were recovered in pure culture, is reported. The joint healed with ankylosis.

An extensive fracture of the humeral shaft involved the musculospiral nerve. The nerve was freed and the fracture fixed with a Parham's band. Rapid and complete cure resulted.

A severe case of infected compound fracture of the humerus was successfully treated by the Winnett-Orr method of vaseline dressing and fixation in Plaster of Paris.

Excellent results are reported from the use of Steinmann's pins, with extension, in fractures of the tibia.

A very acute case of Ludwig's angina required the performance of an emergency tracheotomy under local anæsthesia. After weathering septicæmia and two attacks of pleurisy, the patient was discharged from hospital on the fifty-first day after admission.

Several difficult cases of perinephric abscess, with complications, occurred during the year.

### Field Operations.

20. These have already been mentioned in the section dealing with malaria. They were chiefly remarkable for the fact that so little effect was produced on the health of the British troops.

### Hospitals and Special Departments.

21. A goodly number of improvements have been effected under the heading of minor works. Major works have been curtailed by financial stringency.

Modernisation of the British Military Hospital at Rawalpindi has been completed. A certain amount of constructional work, together with many alterations and improvements have been carried out at the British Military Hospital at Quetta.

The venereal section at the Connaught Military Hospital, Poona, has been improved in various ways. At Jubbulpore a venereal disease treatment room has been provided and the operation theatre remodelled. At Cawnpore constructional work included a heatstroke room, and isolation block and venereal disease wards.

In several stations new quarters have been built for the Indian Medical Department and the Indian Hospital Corps; but in this direction—and especially in the case of the latter—much still remains to be done.

The surgical equipment of hospitals has now been almost completely modernised and, on the whole, the surgeons and others concerned seem to be well satisfied with the results.

*Surgery.*—The total number of operations performed by specialists during 1932 was 2,942, of which 1,569 were major and 1,373 minor.

Emergency and minor operations carried out by general duty officers are not included in the above figures.

The following brief notes have been extracted from some of the surgical specialists' reports:—

A British soldier was convalescing after an operation on his knee, when he developed abdominal pains and vomiting. His symptoms were atypical; but, as they were persistent and severe, laparotomy was performed. An acute inflammation, localised to three feet of the small intestine, was discovered. The affected portion was swollen and hæmorrhagic; but, as a pulse was palpable in the adjacent branches of the mesenteric artery, and as the patient's general condition precluded a lengthy operation, the abdomen was closed without anything more being done. An uninterrupted recovery followed. This was probably a case of thrombosis of a mesenteric vein, overcome by lateral anastomosis. Such cases rarely recover.

Three cases of severe general peritonitis, followed by operation and recovery are reported. One was due to perforation of a duodenal ulcer, a second to gangrene of the appendix and a third to perforation of an enteric ulcer. In the last case a pure culture of *Bac. typhosus* was isolated from the peritoneal exudate.

A patient was admitted suffering from "colic". He gave a history of a fall from the Swedish horse in the gymnasium four days previously. By the morning of the second day marked subcutaneous emphysema,

### Deformities of the Foot.

17. The table below shows the incidence:—

TABLE 23.

	Admissions.	Invalids
Hammer toe	22	1
Flat foot	11	7
Hallux valgus	4	1
Hallux rigidus	3	4
Pes cavus	1	1
Total	41	14

### Diseases of the Areolar Tissue, and Local Injuries.

18. As is to be expected, this young, healthy and athletic population faces exceptionally high risks with respect to vocational and recreational injury, and subsequent infection due to life in the tropics. Admission rates are therefore high.

Under "Areolar tissues" admissions totalled 2,816, with a ratio per 1,000 of 50.9. There were 2,334 cases of cellulitis and 435 of boils.

Under "Local injuries" there were 3,239 admissions with 27 deaths, giving ratios per 1,000 of 58.5 and 0.49 respectively.

All these figures were well below those for 1931.

The injuries included sprains, contusions and abrasions, 1,838; wounds, 305; gun-shot wounds, 42; fractures, 730; and dislocation, 115.

### Effects of Heat.

19. Recently there has been a revival of interest amongst medical officers in the interesting conditions which are included under this heading. Fresh observations and methods of treatment are in train, the results of which may be published later.

Climatic conditions in 1932 have already been described in this report, in the section dealing with malaria.

In 1931 there were 285 admissions (ratio per 1,000, 5.1) with 18 deaths (ratio per 1,000, 0.32).

In 1932 there were 229 admissions (ratio per 1,000, 4.1) with 18 deaths (ratio per 1,000, 0.33). The admissions included 50 cases of heatstroke and 178 of heat exhaustion.

The stations in which more than ten cases of "Effects of Heat" occurred during the year were:—Meerut (43), Agra (22), Allahabad and Cawnpore (20 each), Lucknow (15), Delhi and Bareilly (13 each) and Benares (11).

In Meerut almost all the cases occurred during a fortnight in June when a very hot wind blew unrelentingly. There were three cases of heat-stroke and 40 of heat exhaustion. Several patients were dangerously ill, but there were no deaths. All units were equally affected.



Or this:—

“The latest device of these unfortunates is to carry out solicitation in the male attire.”

The following is a list of the stations in which admissions per 1,000 exceeded 50:—

TABLE 21.

Stations.	Admission ratio per 1,000.	Stations.	Admission ratio per 1,000.
Benares .	185.5	Ambala . . . . .	59.9
Mandalay	171.6	Calcutta . . . . .	59.2
Barrackpore	109.3	Dacca . . . . .	55.6
Madras .	105.7	Hyderabad . . . . .	53.5
Maymyo	104.9	Delhi . . . . .	52.3
Muttra	89.7	Bangalore . . . . .	50.6
Cawnpore	64.1		

The following table shows the incidence of each member of the group in ratios per 1,000, since 1928:—

TABLE 22.

Year.	Gonorrhoea.	Syphilis.	Soft Chancre.
1928	34.5	6.9	8.1
1929	31.5	6.0	8.0
1930	27.4	6.1	6.7
1931	29.5	6.8	6.2
1932		6.0	5.5

### Diseases of the Respiratory System.

15. Admissions totalled 1,398 giving a ratio per 1,000 of 25.3, as compared with 26.1 in 1931.

Acute and chronic bronchitis, and catarrhal pneumonia accounted for 976 admissions, with three deaths and eight invalidings. In 1931 the figures were 989, five and eight respectively.

88 cases of pleurisy and 48 of laryngitis occurred as against 111 and 31 last year.

Lobar pneumonia admissions amounted to 187 (ratio per 1,000 3.4) of whom 24 died and two were invalided. The case mortality per cent. was 12.8. In 1931 the ratio of admissions per 1,000 was the same (3.4) but the case mortality was only 9.9 per cent.

### Diseases of the Digestive System.

16. Admissions for this group decreased from 6,237 in 1931 to 5,752 in 1932.

Admissions for the more important members of the group are detailed below:—

Tonsillitis	1,864
Diarrhoea	732
Jaundice	476
Appendicitis	436
Pharyngitis	423
Constipation	360
Gastritis (acute and chronic)	225

this period into four decenniums, the admission ratios per 1,000 for pulmonary tubercle are 3.72, 1.75, 1.22 and 0.94.

### Undulant Fever.

13. A small outbreak of five cases of undulant fever occurred in a company stationed in Amritsar.

The organism was isolated by blood culture in two cases, and all five gave high agglutination results.

On serological investigation the organism proved to be more closely related to the strain known as *B. paramelitensis* than to the others. Enquiry revealed that the men (contrary to all instructions) had been consuming unboiled milk bought from a bazaar milkman, and that it was highly probable that there was goat's milk mixed therewith.

### Venereal Diseases.

14. In 1931 the steady fall in incidence of this group was checked by a rise of 2.3 per 1,000. Once again the fall has been resumed. In 1932 the rate fell to 37.7—a figure which has only been bettered in two previous years, *viz.*, in 1915 and 1916, when India was stripped of regular troops and garrisoned largely by units of the Territorial forces from home.

Three classes of factors have combined to bring about this decline; regimental, hygienical and personal.

The first is the most powerful and permanent. It represents the "home" influence on the soldier's life. The more the man is kept happily and busily occupied within his unit's lines, the less likely is he to spend his leisure moments in the bazaar.

The second is only of importance up to a point. It exercises a restricted, advisory influence which falls far short of that wielded by nearly every other advanced army medical authority in the world.

The third increases in importance year by year. At the present rate of progress in social standing, temperance, outlook and education of the man in the ranks, this factor may well become decisive in lowering the incidence of venereal diseases in India.

In commenting on this matter in their annual reports, three of the specialists mention that the soldier knows much more about venereal diseases (including the use of the condom) than he did in the old days.

The march of civilisation is not without its drawbacks. Of late, in certain civil circles in India, there has been a drive against recognised prostitution, and in several large towns brothels have been declared illegal. As a result:—

"Prostitutes have migrated to other parts of the city, thereby increasing the difficulties of the police. Numbers of these women have also taken up scattered quarters in the military cantonment and, as this area is not controlled by the municipality, they cannot be ejected without invoking the procedure authorised by the Cantonment Acts. This procedure is slow, cumbersome and uncertain."

Experimental trials of an outfit designed for the field diagnosis of malaria and dysentery are now nearing a successful conclusion.

There is no doubt that the appearance of plasmosquine and atebirin has re-awakened interest in the whole subject of malaria in the army in India; and credit is due to all the clinicians and epidemiologists who have been working on the problem throughout the year: they have risen to the occasion.

### Small-pox.

11. In 1932 this disease showed a heavy incidence amongst the civil population of British India. The following number of cases were reported by quarters:—

Quarter ending 31st March . . . . .	21,093
Quarter ending 30th June . . . . .	40,218
Quarter ending 30th September . . . . .	17,491
Quarter ending 31st December . . . . .	21,473

The number of cases amongst the British military population was:—  
Officers (2), Other ranks (4) 6, Wives (1), Children (1) 2.

The next table shows the British military half yearly vaccination state:—

TABLE 19.

	Percentage protected.*	
	On 31st March.	On 30th September.
British officers . . . . .	98.53	97.78
British other ranks . . . . .	99.06	99.65
Wives and children . . . . .	98.97	99.19

### Tuberculosis.

TABLE 20.

12. The incidence of pulmonary tuberculosis in 1932 was as follows:—

Pulmonary—	Actuals.	Ratio per 1,000.
Admissions . . . . .	58	1.10
Deaths . . . . .	3	0.05
Invalids . . . . .	44	0.80

Tuberculosis of other organs caused 19 admissions, one death and 15 invalidings.

It is satisfactory to record that, during the past 40 years, there has been a steady, if slow, decline in the incidence of this disease. Dividing

\* that is—

- (a) has been successfully vaccinated within the last five years, or
- (b) shows evidence of immunity by three unsuccessful vaccinations (carried out at intervals of one month) within the last five years and
- (c) bears distinct marks of small-pox.

minary administration of quinine for the first two days—although this is not in accordance with the latest report on the subject.\*

No toxic effects of any importance have been recorded.

The point now to be determined is: has atabrin a more powerful and lasting sterilising effect than quinine? Or, in other words, how does the relapse rate of atabrin-plasmoquine treated cases compare with that of patients treated with quinine-plasmoquine? At present we cannot answer that question; but an answer to it should be forthcoming during the course of 1933. In this connection, the fact, that atabrin continues to be excreted long after its administration has ceased, may turn out to be a factor of importance.

No reports have been made which throw any light on the allegation made by some observers, that atabrin in combination with plasmoquine forms a definitely toxic mixture. The army practice is to administer the drugs consecutively, not simultaneously.

Excerpts from recent circulars on the methods of administration of the new drugs are printed as Annexure III of this Report.

One of the great drawbacks to the use of quinine alone lies in the length of time occupied in treatment and after treatment. It is apparent that the advent of the new synthetic drugs has successfully overcome this defect. From the military as well as the medical and economical aspects, this is a most important advance.

There has been no recurrence of the disease in Wellington.

The results of the investigation at Mingaladon were published by Captain M. Jafar, I.M.S., in the "Indian Medical Gazette" of September, 1932.

In Kohat the civil co-operation scheme continues to give good results, and its extension—in practical form such as this—is ardently to be wished for. There are many stations in which it might be applied with great mutual advantage to all concerned.

In Poona the medical authorities obtained the active co-operation of the whole garrison, and the result was an outstanding success. In that station the big Bhaiaroba Nullah has been a source of mischief for years, and the anti-malaria organisation has never been able adequately to cope with it. In 1932 the station commander agreed to the apportioning of the nullah into sections, each section being handed over to one of the combatant units. In this way one British battalion, one Indian cavalry regiment and two Indian battalions were connected up with the scheme. Excellent progress was made with the canalisation and grassing of this nullah: progress quite beyond the unaided powers of the station anti-malaria organisation.

Again there has to be recorded a marked decline in the numbers admitted to the Malaria Treatment Centre, with a consequent shortage of clinical material. Undoubtedly this reflects the more efficient methods of treatment in vogue in the hospitals outside.

An adaptation of the peace mosquito net for use in the field has been approved; and the provision of mosquito-proof tents is now possible.

---

\* "Observations on the Cure of Malaria with Atebrin". A. L. Hoops, O.B.E., M.D., D.P.H. *British Medical Journal*, June 10th, 1933.

been using the drug since its introduction to the army in India. The latter are agreed on two points:—

- (a) That, for therapeutic purposes, a dose of 0.02 gramme daily, in combination with quinine or atebtrin, is insufficient.
- (b) That a dose of 0.03 gramme, in combination with quinine or atebtrin, is, as a rule effectual; but that even in this comparatively small dosage, the drug may be mildly toxic.

Since that is an observation made on hospital patients—nearly all of the indoor class—can it be said that 0.03 gramme is a safe dose for soldiers who are carrying out their full duties in peace, let alone in war? Observation and experience up to date compel a negative answer. However, it is clear that even such a small dose as 0.02 gramme of plasmoquine exercises a powerful delay action, without interfering in any way with the subjects' physical activities and general well-being. The importance of this from a military point of view is obvious.

As a therapeutic, plasmoquine established its position during the course of 1932. Full reports will not be available until 1933, but already it is certain that the drug has come to stay—until, at least, something still better displaces it. The average relapse rate for all India over the quinquennium 1927-31 was 277 per 1,000. Dixon gives the relapse rate under quinine as 500, and Manifold quotes the more accurate figure of 420.\* In 1932 those clinicians who were using plasmoquine on the basic dosage of 0.03 gramme secured a relapse rate per 1,000 which varied from 30.5 to 40.5. Major Dixon's figures (on which absolute reliance may be placed because, amongst other things, the time factor was not neglected) ranged from 20 to 47 per mille. It is unnecessary to emphasise the practical importance to the army in India of the benefits revealed by statistics such as these.

The question of toxicity may be dismissed with the remark that, even in the small dose of 0.03 gramme, it may—as stated above—be evident; but that, in so far as hospital patients are concerned, it is so mild that it can be disregarded.

It should be noted that the results quoted above, and the remarks thereon do not refer to the use of plasmoquine alone, but to its administration along with quinine and (or) atebtrin; as a rule, with the former.

Atebtrin was introduced into army practice too late in the malaria season of 1932 to permit of definite conclusions being reached regarding its comparative value. Reports on which to base such conclusions will not be available until the middle of 1933. In the meantime preliminary reports indicate that the clinicians are impressed with the efficacy of this drug. It is generally held to be as powerful in action as quinine; but most observers report that it is slower in getting to work. They prefer to start a course of atebtrin-plasmoquine treatment with a preli-

---

\* "Report of a trial of plasmoquine and quinine in the treatment of benign tertian malaria" by Major J. A. Manifold, D.S.O., R.A.M.C.; and "A report on six hundred cases of malaria treated with plasmoquine and quinine", by Major H. B. F. Dixon, M.C., R.A.M.C., *Journal of the Royal Army Medical Corps*, May-June, 1931 and June, 1933, respectively.

The absence of "controls" during the year under review renders it difficult to express an opinion on the results achieved by the prophylactic quinine issued, but it is significant that our findings as regards the relations of meteorological conditions to malaria incidence point to the fact that the year under review should have shown a somewhat higher incidence of malaria than was actually the case, and it is considered that the issue of prophylactic quinine as a reason for the reduced incidence cannot be altogether discounted.

It is thought that until some more satisfactory means of protection of troops is found, quinine prophylaxis must continue to be adopted in special circumstances such as years likely to produce an epidemic or very high incidence of malaria and in special conditions such as on field service, when mosquito nets cannot be used, and practically no other method of prevention is available."

However, these opinions would not be accepted in their entirety by every military medical officer in India. The more usual experience is reported from another district in which a heavy malarial incidence occurred, thus:—

"Prophylactic quinine was issued in the three biggest stations in the district. No apparent benefit followed. In one station certain units were kept as controls, but in these the malarial incidence was no higher than in the protected (sic) units".

The prophylactic value of plasmoquine was tried out on a large scale in Burma, between September 1931 and February 1932. Well over 5,000 officers and men took part in this experiment, and the results were reported by Colonel P. J. Hanafin, D.S.O., Assistant Director of Medical Services, Burma District, in the Journal of the Royal Army Medical Corps, Volume LX, No. 6, June 1933.

On the whole, the results were moderately good, but it must be remembered that, as reported, they present a too favourable picture, since the cases were not followed up to the beginning of the recognised malaria season which came after the one in which the experiment was made. Had it been possible, the "follow-up" should not have ended before the south-west monsoon was well established in July 1932. Unfortunately, by that time, most of the troops were dispersed to their peace stations, scattered all over India and Burma—a termination which made full and reliable statistics difficult to obtain. Several stations *ex-Burma* reported an increased malarial incidence which was attributed to the return of troops infected in the Burmese operations—amongst them Secunderabad . . . . "In Secunderabad an increase occurred which may be due to the Manchester Regiment having been infected in Burma" . . . . The admission ratio for this station in 1932 was 26·1; in 1931 it was 4·1, and in 1930 8·2 per 1,000.

There is now no doubt that Colonel Hanafin is right when he says that; "A dose of 0·02 gramme (the amount decided on after consultation with Army Headquarters) is definitely too small"; but when it is added that: "The correct dose will probably be found to be 0·03 or 0·04 gramme", the matter becomes one not of prophylaxis, but of therapeusis. That is clear from the reports of our clinicians who have

war District experienced an unusually low malarial incidence, and the health officer there made the following remarks on the subject:—

“ This measure of malaria prevention or, rather, early cure was practised throughout the District in all plains stations as regards both British and Indian troops from August to November. The dose given was grs. x of quinine sulphate daily with a small dose of magnesium sulphate with the exception of Sundays when nothing was given.

A considerable amount of work has been carried out in previous years in the Peshawar District, particularly by Major T. Young, R.A.M.C., in connection with quinine prophylaxis, and, apart from his findings which indicated definitely a lower incidence of malaria in troops given prophylactic quinine than in others, a large body of expert opinion is in favour of the measure.

The points in regard to it given below summarise the situation—

- (1) It diminishes the occurrence of clinical symptoms.
- (2) It reduces liability to pernicious attacks of malaria.
- (3) It has a definite reducing effect on the numbers of B. T. as distinct from M. T. carriers of malaria.
- (4) It may not prevent the occurrence of infection.
- (5) It has little or no effect in sterilising carriers of M. T. malaria.
- (6) It may produce a number of latent infections which will show clinical symptoms when the quinine is stopped.
- (7) Quinine is a protoplasmic poison and probably taken over long periods even in small doses may do a little damage to renal and other tissues.
- (8) There are times and places for the issue of prophylactic quinine and it should be given not as a routine each year but under special circumstances and in special situations.

Two arguments against the use of prophylactic quinine which appear to come to the fore are, firstly that when the drug is stopped, there is invariably a rise in the number of admissions for malaria, and secondly that with men infected with M. T. malaria, the symptoms are kept under and such men therefore do not report sick and may become crescent carriers.

As regards the first, it cannot be expected that prophylactic (or early treatment) quinine will cure all men infected, and such a rise in admissions after cessation of the drug must be expected. The point at issue is not the mere fact of such an increase, but the effect of the quinine on the total incidence of the disease.

The second argument is certainly an important one, and undoubtedly as a result of prophylactic quinine, crescent carriers may go about undetected, but surely this is also likely to happen in regard to men who do not receive prophylactic quinine and who develop M. T. malaria and are treated in hospital.

The issue of plasmoquine prophylactically and in very small doses at intervals during a short period of the year would appear to be the remedy for this difficulty.

Before discussing the effects of drugs, it is necessary to say something about the differential diagnosis of "fresh" and "relapse" malaria.

Hitherto this vexed question has been left to the decision of clinicians on the spot, and the distinguishing criteria have varied with individual opinions and experience. In practice there has been absolutely no uniformity of standard.

In an attempt to remedy, or partially remedy, this unsatisfactory state of affairs, the Circular\* which forms Annexure II to this Report was issued from Army Headquarters to all medical officers.

This leads next to the question: What is a malaria prophylactic?

The answer is:—A drug which, entering the patient's blood-stream, kills the parasites of malaria before these parasites have reached that stage of development which manifests itself in the clinical signs and symptoms of the disease. The drug must be persistent in action. Its effect must be continuous over the whole period which separates the administration of any two doses; and it must exercise its effect in prophylactic, in contradistinction to therapeutic, doses. That is, it must be capable of administration in such amounts and at such times, that the soldier's ordinary life and work are in no way interfered with.

Is there any evidence that such a drug exists?

The reply to this question is an emphatic negative.

There is ample evidence to show that there are certain drugs which exercise a greater or lesser delay action on the onset of clinical signs and symptoms of the disease—and that is as much as we are at present entitled to say.

In view of the enormous literature which has grown up on the absolute and relative merits of quinine and the synthetic drugs, it may seem somewhat late in the day to discuss them from the standpoint of trial and experiment. To some it may even seem strange to incline to a verdict of "not proven". But the army in India forms a big and controlled field suitable for clinical and epidemiological investigation; so suitable, that its advantages as such would be weakened, or might even disappear, were the factor of lapse of time to be disregarded. It is so easy to jump to rapid conclusions: it is so difficult to restrain one's impatience; it is so tempting to "obtain results". Many medical argosies have been wrecked on the rock of Time, and not a few have sailed under the flag of some drug which has been prematurely vaunted as a malarial prophylactic. It is therefore not surprising that the advent of the new drugs has but increased the number of wrecks; and, bearing in mind the provisos to which a true prophylactic drug must conform, surely it is essential to be careful and, above all, cautious in estimating the worth of the article.

As regards the prophylactic value of quinine, the usual conflict of opinion is found in the annual reports of districts and commands. On the whole, army medical opinion of to-day is not enthusiastic. Pesh-

---

\* No. Z-12050/1 (D. M. S. 3), dated 10th June 1933.



In connection with this subject the following figures are of interest:-

TABLE 17.

Station.	Date of mosquito-proofing.	Malaria, Admission ratios, per 1,000 of strength.				
		1924.	1925.	1926.	1929.	1932.
Amritsar . . .	1925-26	1,172.7	825.7	244.3	206.1	56.6
Lahore . . .	1927-30	1,038.4	706.2	613.5	190.2	76.4
Delhi . . .	1927-28	487.2	259.1	346.2	114.3	198.3
Peshawar . . .	1927-31	398.1	386.4	496.1	569.6	115.2

Amritsar average for five years 1920-24 458.2

Lahore average for five years 1923-27 . 742.9

On 24th September, 1931, it was "decided that, in view of the present financial stringency, no further new works in the direction of mosquito-proofing of buildings should be undertaken until the financial situation is more normal". Recently, owing to the serious state of affairs at Agra, special sanction was given to proof the fort at that place. With this isolated exception, this important measure of protection is now banned; and for how long the ban is likely to remain in force, no one can say.

The following is a list of the most heavily infected stations, with strengths of over 700, and exclusive of hill stations, in order of admissions per 1,000 for malaria:—

TABLE 18.

Station.	Admission ratio per 1,000.
Agra . . . . .	310.3
Delhi . . . . .	198.3
Karachi . . . . .	188.0
Ambala . . . . .	162.9
Ferozepore . . . . .	152.3
Jhansi . . . . .	152.3
Cawnpore . . . . .	142.3
Mhow . . . . .	136.3
Ahmednagar . . . . .	129.4
Allahabad . . . . .	119.1
Peshawar . . . . .	115.2
Landikotal . . . . .	102.8
Nowshera . . . . .	90.8
ALL INDIA . . . . .	84.1
Quetta . . . . .	81.8
Sialkot . . . . .	81.5
Lahore . . . . .	76.4
Jubbulpore . . . . .	76.0
Colaba (Bombay) . . . . .	73.7
Bareilly . . . . .	57.1
Nasirabad . . . . .	56.5
Poona . . . . .	56.4

The hard fact is, that we know well how to deal with the malaria problem; but—unlike the Canal Zone authorities—we have not the funds with which to put our knowledge to adequate practical use.

Civil and other disturbances affected the health of the troops in several garrisons, such as Bombay and Poona, Sialkot and Lahore, Waziristan and the Chitral road. Also, the aftermath of the operations in Burma made itself felt, as at Secunderabad. However, it was generally remarked that these untoward features of the year produced on the British troops engaged an effect less adverse than might be expected. To this there were two exceptions, *viz.*, in Bengal and Waziristan.

The Bengal Area is in special occupation on account of the "terrorist" movement. Here, the living arrangements of the troops are of a temporary kind, and the uncontrolled (and often uncontrollable) surroundings render anti-malaria defence difficult in the extreme. At Dacca the ratio per 1,000 was 350.

Again, at Razmak and Wana in Waziristan the ratios were 73 and 325 respectively, despite the fact that both stations are high and healthy. In these instances, however, the disease was contracted on road making, road protection and convoy duties in the low-lying valleys. In Waziristan, the greater the military activity, the higher the malarial incidence.

The steady improvement which has been noted in the quality of the field work is largely due to the excellent course of instruction which is held annually at the Ross Field Experimental Station at Karnal, under the direction of Lieut.-Colonel J. A. Sinton, V.C., O.B.E., I.M.S., Director of the Malaria Survey of India. Anti-malaria officers who have been through this course are not only able to tackle their duties in a scientific manner, but they are filled with an enthusiasm which rises superior to the many and great practical difficulties with which they are faced in their station work. In this field of army medical activity in India, there are, as everyone knows—

"So many worlds, so much to do,

"So little done, such things to be".

From 1928 to 1932 a certain amount of progress was made with the mosquito-proofing of barracks. However, this measure is necessarily limited by the exigencies of finance, and in amount it is still very far short of the modern minimum considered essential by the more advanced sanitarians such as the Americans. Indeed, in this direction there is no comparison between conditions in India and, say, the Panama Canal Zone. In India, only a few of the most dangerous places are proofed; and even in these places the proofing is often only partial. Thus the degree of this mode of protection varies from nearly 100 per cent. as in Amritsar and Lahore, to a mere fraction, as in Delhi, Allahabad and Bombay, where only the old forts are proofed. For these reasons it is well-nigh impossible to say to what extent mosquito-proofing has influenced incidence. That, in some cases, it has had a marked effect on local incidence is certain; but that it has had much effect on the general incidence rates is not likely.

logical conditions are against him—as they were in 1932 compared with 1928—he is at great risk. This is a risk to which the British soldier is not exposed at all. In all other respects, the Indian soldier enjoys the same care and protection *vis à vis* malaria as his British comrade.

Reverting now to finance—in 1932 funds were made available for sanitary anti-malaria field work, for certain minor engineering works and for the routine upkeep and repair of major engineering works already in existence. But the year differed from 1928 in as much as the greatly reduced grant brought new major engineering work almost to a standstill. Financial stringency called a halt on progress, and, so far as can be seen at present, this unfortunate state of affairs is likely to continue indefinitely.

In 1928 the sum of £8,380 was spent on new major engineering anti-malaria work.

In 1932, and despite the need for drastic economy, the commands felt it incumbent on them to demand for this purpose sums which totalled £18,795. The amount actually available to meet these demands was only £1,521, or eight per cent. of the amount which local authorities considered to be the essential minimum.

Page 60 of the Report of the Malaria Commission of the Health Organisation of the League of Nations, on its Study Tour of India, August to December, 1929, contains the following remarks:—

“What Mian Mir showed was that this kind of work as carried out by Christophers and James cannot be done cheaply and easily and that, as soon as it is stopped, the results are quickly lost”.

That remark applies with equal force to all other cantonments in India.

The total amount allotted for 1932 represents an expenditure on sanitary and engineering held works of 10*d.* per head, military population; or, if British women and children be excluded, of about 11½*d.* per head. It is interesting to compare this with the budget of the highly malarious, but relatively small, Panama Canal Zone where, in 1928 (the latest year for which these figures are available) the sum of £24,167, or £1-15-4 per head was expended on field work.\*

In 1928, in the Canal Zone, the malaria admission rate was 14 per 1,000 and the deaths *nil*.

In 1932, in India, the British troops lost about 32,578 days spent in hospital on account of malaria alone—a matter of serious economic importance to the State.

\* “Twenty-five years’ of American Medical Activity on the Isthmus of Panama, 1904-1929; a Triumph of Preventive Medicine”. Weston P. Chamberlain, Colonel, Medical Corps, U. S. Army. Chief Health Officer, the Panama Canal. The Canal Press, 1929, pp. 27, 29 and 31.

(d) In 1932 the monsoon opened weakly, and there was a prolonged break in the rains in August, average defect 3 per cent. During the retreating period the rainfall varied from normal to excess in different parts of the peninsula. Averaged over the plains, the total rainfall of this period was in excess by 18 per cent.\* Thus, the year now under review, and its three antecedent years, were climatically more or less favourable to a high malarial incidence. In addition, in 1932 the type of rainfall was often of a particularly dangerous kind. During the height of the malaria season, in an appreciable number of stations which are situated in some of the worst endemic areas, moderate rains fell at short intervals—a state of affairs which, as Deaderick points out,† is more productive of breeding pools than any other type of rainfall. The effect on the one hand of drought, and on the other hand of moderate to heavy, sporadic showers, is reflected in the incidence of these extremes. Thus, at Fort Sandeman, in August, the rainfall was excessive, and of a dangerous type, with the result that, in September and October the malaria incidence was very heavy, and included a large proportion of malignant cases. The same thing occurred at Karachi, where unusual precipitation took place in July and August, followed by a high incidence, with many malignant cases. At the same time, notoriously malarious places such as Ferozepore and Lahore were enjoying an abnormally dry season, with the result that their incidence was uncommonly low.

Admission rate per 1,000:—

	1924.	1932.
Lahore . . . . .	1038·4	76·4
Ferozepore . . . . .	427·6	152·3

An interesting note on the subject by Major A. E. Richmond, O.B.E., R.A.M.C., is printed as Annexure I of this Report.

Perhaps the most striking evidence in support of the thesis that climatic conditions in 1932 were inimical to a good malaria year is to be found in the incidence of the disease amongst the Indian troops. Thus:—

	1928.	1932.
British admission ratio per 1,000 . . .	91·3	84·1
Indian admission ratio per 1,000 . . .	87·8	145·0

The place *par excellence* in which the Indian soldier contracts malaria is his village. He proceeds there on two or three months' leave or furlough in the height of the malaria season. He is not protected against the disease at home, as he is when in barracks; and, if meteorological

\* Annual Reports of the Government of India, Meteorological Department.

† "A Practical Study of Malaria", by William H. Deaderick, M.D.

elsewhere. Averaged over the plains of India, the total rainfall of the period was in defect by four per cent.

In August mean temperature was, on the whole, appreciably high over the region extending from the frontier to the central parts of the country owing to the general deficiency of rainfall in those areas, while the withdrawal of the monsoon caused the day temperature to be markedly high in the Punjab East and North, the United Provinces and Central India East during most of September. The North-East monsoon caused exceptionally heavy rain along the east Madras coast at its inception during the third week of October; thereafter its activity was more or less confined to the extreme south. In North-West India, winter conditions were well established with abundant rainfall everywhere during the last week of November.

In November a cold wave appeared on the frontier about the 28th and affected the whole of north-west India during the next two days, its effect being most pronounced in Baluchistan and the North-West Frontier Province. Taking the year as a whole, rainfall was within 25 per cent. of the normal in all the sub-divisions except in Baluchistan and Sind, where it was in moderate or large defect".\*

As the abnormal dryness of the season especially affected the most malarious parts of the country in which troops are stationed, and at the most critical times of the year, it is not surprising that the malarial figures were, in a comparative sense, low. Further, it has been remarked that: "The last five years have, however, been increasingly favourable climatic years, so that it is difficult to say to what extent the great reduction in the incidence of the disease is due to this (field) work.†"

No such difficulty arises in the case of the year 1932, because:—

- (a) In 1929 climatic conditions were adverse. During the South-West monsoon months, although rainfall over the plains averaged a one per cent. deficiency (except in the North-West Frontier Province and Burma, where it was in large excess) it was in excess by ten per cent. during the retreating monsoon period. The excess was very marked in the Punjab.
- (b) In 1930 the monsoon season was more or less normal; but the retreating monsoon yielded a rainfall in excess by 19 per cent. although this did not specially affect the most malarious areas in which the British troops are stationed.
- (c) In 1931 the monsoon was again more or less normal. Averaged over the plains of India, the season's rainfall was in excess by 4 per cent. As in the previous year: "The retreating south-west monsoon period was characterised by excessive precipitation in and around central India. Averaged over the plains of India, the total rainfall of the period was in excess by 46 per cent."

---

\* Government of India, Meteorological Department, India—Weather Review Annual Summary for 1928—Part A, Page A-1.

† War Office Report on the Health of the Army for the year 1928. Volume LXIV, Section "Anti-malaria work", on page 93.

Climatic conditions—the most important of all—were in favour of a good malaria year in 1928. This was by no means the case in 1932.

*Finance.*—In 1928 the grant for anti-malaria measures—practically all field work, sanitary and engineering—amounted to £15,028. In 1932 this was reduced to £10,189. The result was that major engineering anti-malaria work came to a standstill.

*Civil and other disturbances.*—From the military point of view 1928 was peaceful, but 1932 was more or less disturbed by the aftermath of the 1931 troubles and by fresh outbreaks. In 1932 the troops were subjected to a considerable amount of very hard work under adverse weather conditions, and in circumstances in which communal and personal anti-malarial measures were difficult—or even impossible—to carry out.

These were the factors which militated against a good year in 1932. As compared with 1928, there were certain factors in 1932's favour, thus:—

*Field work.*—There is no doubt that, as time passes, the scientific quality of this work improves, and the enthusiasm and energy of the officers engaged on it steadily increases. This is a curious but encouraging fact, for most of these officers are much hampered in their work by lack of funds, and by the duties which they have to perform additional to their anti-malaria duties.

*Mosquito-proofing.*—Although this measure was in force from 1928 to 1932, it cannot be said that the latter year gained much advantage on that account, because the amount of proofing done during that period was comparatively insignificant. The proportion of proofed to open barrack buildings in India is small.

*Plasmoquine.*—In 1928 this drug was not in use. By 1931 it was listed as official, and in 1932 its potentialities for good were studied on a large scale. Partly by a process of exclusion, and partly from slowly accumulating clinical and statistical evidence, the tentative opinion is now expressed that the more extensive and intelligent use of plasmoquine is mainly responsible for the fact that 1932 was a record year. This opinion must be tentative in the meantime, because the full results of the first year's systematised administration of the drug are not yet available.

It may now be of interest to consider these divers factors, *pro* and *con*, in more detail.

In 1928, “during the hot weather months, March to May, rainfall was normal or in slight defect in Burma, North-east India and the Madras Presidency including Mysore. Elsewhere weather was much drier than usual, so that over the country as a whole, there was a deficiency of 14 per cent. in the season's rainfall.

The principal feature of the monsoon season, June to September, was the marked deficiency of rainfall in North-West India including the United Provinces, where weather was persistently dry for a considerable period, the effect of drought being most keenly felt over the area extending from Allahabad and Lucknow to Delhi and Jhansi. The monsoon rainfall was also in slight defect in Central India, the Central Provinces, Mysore and Madras and normal or in slight excess

it neither includes out-patient attendance, nor indicates the degree to which the disease adversely affects general physical efficiency.

It is, therefore, impossible to regard these figures with equanimity; but although, in an absolute sense, they are profoundly disturbing, in a relative sense they are not without a certain amount of comfort and encouragement, since the situation seems to maintain the steady, if somewhat slow, improvement which has been a feature of recent years. This is especially evident in the case of the Northern Command, in which malaria plays more havoc amongst the troops than in any other area in India. In this command, a decline is shown in the admission rates (per 1,000) during the past eight years, thus:—

Year.	Ratio per 1,000.
1925 . . . . .	291.00
1926 . . . . .	268.00
1927 . . . . .	208.00
1928 . . . . .	112.19
1929 . . . . .	193.46
1930 . . . . .	205.79
1931 . . . . .	138.40
1932 . . . . .	91.15

During the past ten years the all India figures have varied much, from those of 1924—the worst year—to those of 1932, the best.

TABLE 16.

Year.	Strength.	Admissions.		Deaths.	Invalids.
		Actuals.	Ratio per 1,000.	Actuals.	Actuals.
1924 . . . .	58,614	12,120	206.8	14	31
1932 . . . .	55,336	4,654	84.1	7	1

Prior to 1932 the record was held by 1928; but although the admission rate for the former was only 0.7 per cent. below that of the latter, there were, between these two years, several points of difference relevant to malarial incidence which call for comment.

These differences were of a kind which led to the supposition that, on the whole, 1932 would be a worse malaria year than 1928; and yet, the reverse turned out to be the case.

It is now proposed to mention the above differences, to examine them, and to offer a conjecture on the reason why 1932 surpassed the 1928 record.

*Meteorological conditions.*—In 1928 India suffered from a marked and uniform lack of rain. In 1932 the rainfall was patchy over the whole peninsula. In some areas drought conditions prevailed, but in others the rainfall was excessive or characterised by heavy showers interspersed with dry spells.

## Malaria.

10. The incidence in the commands and the all India figure for the years 1931 and 1932 are shewn in table 14.

TABLE 14.

*Malaria ratio per 1,000—British.*

Commands.	Fresh.		Relapse.		Total.	
	1931.	1932.	1931.	1932.	1931.	1932.
Northern . . .	63·7	41·9	76·5	49·8	140·2	91·7
Eastern . . .	79·0	57·6	33·5	31·9	112·5	89·5
Southern . . .	44·8	40·4	35·8	22·0	80·6	62·4
Western . . .	95·6	87·5	45·2	43·6	140·8	131·1
Burma District . .	52·3	36·4	14·0	9·9	66·3	46·3
All India .	64·8	49·2	47·7	34·9	112·5	84·1

*Admissions by types, for the year 1928-32.*

TABLE 15.

Year.	Strength.	Fresh.						Relapse.						Total.
		B. T.	M. T.	B. T. and M. T.	Clinical.	Cachexia.	Quarten.	B. T.	M. T.	B. T. and M. T.	Clinical.	Quarten.	Cachexia.	
1928 .	56,327	1,665	516	...	243	...	8	2,283	134	...	260	...	3	5,142
1929 .	55,628	2,557	1,283	21	253	8	8	1,681	295	18	328	1	1	6,454
1930 .	55,427	2,361	739	23	409	5	19	2,527	190	19	280	2	...	6,564
1931 .	55,842	2,470	849	28	254	3	17	2,276	163	9	212	1	...	6,282
1932 .	55,336	1,586	818	27	281	...	11	1,615	121	7	186	1	1	4,654

From these figures it will be seen that malaria maintains its pride of place as the scourge of the army in India. In 1932 admissions for this disease formed 14·5 per cent. of the admissions for all forms of injury and disease; and this percentage only represents hospitalisation;



number of cases of amœbic dysentery. This has its counterpart in the state of affairs in the United Kingdom, where considerable numbers of the population are cyst-passers but where there is no amœbic dysentery.

The only conclusion which can be drawn from these observations is that the cyst-passer is only one of many factors concerned in the spread of amœbic dysentery.

Admittedly the complete protection of an individual from infection with cysts would eliminate amœbic dysentery. Such a measure of protection has been the goal of the system in vogue, but in Indian circumstances has proved impossible of attainment. The half measure of success which has been realised has produced no results, and, on the other hand, has in many cases resulted in grave injustice to the individual and much inconvenience to his employers.

In view of these facts, the conclusion has been reached that the present policy is not a practical proposition: routine investigations for the exclusion of cyst-passers will therefore be abandoned.

An interesting feature of the year is the marked increase in dysentery which took place in Quetta, the ratio being for British troops 64.3 as opposed to 22.9 in 1931 and an average of 19.5 for the three years 1929-1931. This increase occurred in the amœbic as well as in the bacillary type, but was relatively more marked in the former.

The outbreak was more or less equally distributed among all units and also amongst families. Bacillary dysentery reached its peak in June and July; a wave of amœbic dysentery occurred four to five weeks after the July rains, and another a similar period after some heavy spates which occurred in August.

The cause of this outbreak was the subject of much investigation. The year was an unduly dry and dusty one in its early months, and the possibility of the outbreak being associated with irritation from dust was carefully considered but the findings were inconclusive.

There was no notable increase in the number of flies. This observation is interesting when compared with the state of affairs in Poona, a station which has normally a relatively high dysentery ratio, and which this year showed therein a marked reduction accompanied by a corresponding freedom from flies.

### *Tropical Abscess of Liver and Hepatitis.*

In all 112 admissions were made for the above condition.

A scrutiny of the case cards shows that of these 69 were probably amœbic in origin. In this figure are included one case which relapsed once and another which relapsed twice.

The difference between amœbic abscess and amœbic hepatitis is one of degree only. Of the above cases, 16 were sufficiently advanced to be called amœbic abscess; and of these three died. The majority of cases responded readily to emetine treatment.

Cysts of *E. histolytica* were discovered in the fæces of only four of these cases.

in 35 of these men, *B. dysenteriae* Shiga in five and *B. dysenteriae* Schmitz in three, while cysts of *E. histolytica* were found in 388 (2·83 per cent.).

In view of the fact that no appreciable decrease in the total dysentery and diarrhoea figures has occurred during the five years in which an extensive search for dysentery carriers has been in operation, the question of the value of these examinations has recently been considered and the following facts emerge.

### *Bacillary dysentery.*

There is no record of the discovery of a true carrier of bacillary dysentery (*i.e.*, a normal individual who, while suffering from no symptoms, regularly or intermittently excretes dysentery bacilli). In supposed cases which have been carefully investigated, the so-called carrier has proved to be an individual who has had the misfortune to be called up for examination at a time when he was suffering from an attack of dysentery, either primary or, in a chronic case, relapse.

There is no doubt that for every one case found in this way during "carrier" tests, innumerable others occur at other times of which nothing is known. It is obviously both unjust and illogical to penalise the unfortunate who happens to be discovered when it is well known that there are many others who differ only in that they have not been detected. Further, a sequel of the present system is, that whenever possible the disease is concealed, and the man continues at work during the only period when he is definitely infective.

It is proposed to change this policy, and to direct attention towards encouraging the active case to report sick and be struck off duty until non-infective. Intractable chronic or relapsing cases will be discharged.

### *Amœbic dysentery.*

The relationship of the so-called *E. histolytica* carrier (more properly termed the *E. histolytica* cyst-passer) to the occurrence of frank cases of amœbic dysentery is a question which merits close attention. During the years in which the search for these carriers has been in vogue in India various anomalies have come to light.

In the first place it is well known that, despite the precautions taken, many cyst-passers escape the net and are employed in duties which involve food handling. The percentage of carriers who are detected varies within wide limits from district to district, and in certain cases from year to year, in a way which makes it clear that in many localities the number of undetected carriers must be much higher than in others. The incidence of amœbic dysentery, on the other hand, pursues a steady course, and in no way reflects the variations which exist in this supposed reservoir of infection.

Again, in one large station careful records have been kept of the incidence, by units, of cases of amœbic dysentery. In no time has the distribution suggested infection from a carrier: on the contrary, it has been roughly proportionate to the numbers at risk.

Another anomalous finding is that the annual number of carriers detected is in excess, and in some stations greatly in excess, of the

*Types of dysentery bacilli isolated.*

## (a) Non-mannite fermenting group—

<i>B. dysenteriae</i> Shiga . . . . .	384
„ „ Schmitz . . . . .	126

## (b) Mannite fermenting group—

Total . . . . .	1,440
-----------------	-------

*B. dysenteriae* Shiga.

It is interesting to note that while the all-India ratio of *B. dysenteriae* Shiga to the non-mannite fermenting group is approximately 1 to 4, in two stations in the extreme north, Peshawar and Kohat, the ratio is almost exactly 1 to 1.

*B. dysenteriae* Schmitz.

The strain of this organism which occurs most commonly in India, although antigenically identical with the types strain, is markedly less agglutinable. The introduction of a more potent diagnostic serum has facilitated the recognition of this organism, whose pathogenic properties are definitely accepted in India.

Several other variants of the non-mannite fermenting group have been defined and are under investigation.

*Mannite fermenting group.*

During the latter half of the year a new system of classification has been brought into use. Hitherto the types of this group recognised were Andrewes' V, W, X, Y, Z, and *B. dysenteriae* Sonne, the remainder being grouped as "Flexner inagglutinable". In this last group many distinct types have now been defined and these have been isolated in considerable numbers in stations throughout India.

By utilising the late acidification of dulcitol and saccharose it is possible to split this group into three sub-groups. Clinical and other data are being collected with a view to confirming the pathogenicity of the newly defined types.

The unclassified strains are being subjected to further investigation.

The treatment of both amoebic and bacillary dysentery follows the same lines as previously. In bacillary cases concentrated serum is being used where indicated with good results.

There were no deaths from dysentery among British Other Ranks. 2 were invalided for amoebic dysentery, 3 for bacillary dysentery, and 3 for clinical dysentery.

*Carriers.*

The examination of food handling menials prior to enlistment and at intervals during their first month of service continues. In all, 13,681 menials were examined with a total of 42,705 bacteriological examinations and 32,645 microscopical examinations, resulting (as far as dysentery is concerned) in the discovery of *B. dysenteriae* Flexner

There is a well marked decrease in the total admissions for these bowel diseases, which would be much more noticeable were it not for the exceptionally high incidence in one station (Quetta).

An analysis of the types of dysentery occurring among British troops gives the following figures:—

TABLE 13.

	Actuals.	Percentage.
Protozoal ( <i>E. histolytica</i> ) . . . . .	215	15.52
Bacteriologically proven . . . . .	508	38.68
Bacillary Exudate (no dysentery bacilli isolated) . . . . .	358	25.85
Clinical . . . . .	304	21.95

} 62.53

Compared with last year's figures, an increase of 4.52 in protozoal dysentery is balanced by a fall in bacillary and clinical dysentery.

An analysis of all cases (British and Indian, officers, other ranks, and families) which were examined by the various laboratories gives the following figures:—

- (1) Cases in which "bacillary" exudate was present on microscopic examination—

Total cases . . . . .	2,621
Dysentery bacilli isolated . . . . .	1,477
Percentage . . . . .	56.34
<i>E. histolytica</i> found (mixed infections) . . . . .	81
Percentage . . . . .	3.09

- (2) Cases with indefinite exudate—

Total cases . . . . .	2,063
Dysentery bacilli isolated . . . . .	382
Percentage . . . . .	18.51
<i>E. histolytica</i> found . . . . .	372
Percentage . . . . .	18.03

- (3) Cases with no exudate—

Total cases . . . . .	3,394
Dysentery bacilli isolated . . . . .	52
Percentage . . . . .	1.53
<i>E. histolytica</i> (vegetative) . . . . .	25
Percentage . . . . .	0.73
<i>E. histolytica</i> (cysts) . . . . .	67
Percentage . . . . .	1.97

TABLE 11.

Group.	Strength.	Actuals.		Ratio per 1,000.		Case mortality per 100.
		Cases.	Deaths.	Cases.	Deaths.	
1932 { Protected .	54,554	172	13	3.15	0.24	7.55
{ Unprotected .	655	16	2	24.42	3.05	12.50
Average { Protected .	53,885	179.4	13.2	2.33	0.24	7.36
of 5 { Unprotected	1382.4	20.2	1.8	14.61	1.30	8.91
years.						

In the second part of this table there is given an average compiled from the figures of the last five years, as the yearly total of cases in the "unprotected" class is a low one and liable in consequence to give unreliable ratios. These figures shew clearly the value of prophylactic inoculation in reducing the incidence of the disease. On the other hand, the case mortality is not greatly affected by inoculation. This is at variance with the generally accepted views on the subject.

The examination of menials for the carrier condition is carried out both at the time of enrolment, and in the presence of an outbreak. Actually there has only been one series of cases which merit the term outbreak—a group of 18 cases of typhoid fever which occurred in Lahore. The remainder were sporadic cases almost certainly acquired from sources outside army control. Seven carriers of *B. typhosus*, one of *B. paratyphosus B*, and two of *B. enteritidis* (Gaertner) were detected prior to enrolment. Two carriers of *B. typhosus* were found among enrolled personnel.

### Dysentery, Diarrhoea and Hepatitis.

9. The incidence for 1930, 1931 and 1932 is shewn in the following table:—

TABLE 12.

Year.	Dysentery.		Diarrhoea.		Colitis.		Total.		Amoebic Hepatitis and Liver Abscess.	
	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.	Actuals.	Ratio per 1,000.
1930 . . .	1,264	22.8	979	17.7	23	0.4	2,266	40.9	63	1.1
1931 . . .	1,593	28.5	862	15.4	19	0.3	2,474	44.3	71	1.3
1932 . . .	1,385	25.0	732	13.2	31	0.6	2,148	38.8	69	1.2

no further agglutination tests will be carried out. Complete tests are however carried out in the majority of enteric group cases (in each at least three tests at intervals of 4—7 days), and an analysis of these is placed below. The figures are compiled from all classes of cases, both British and Indian, and show the results of tests with both “H” and “O” emulsions of organisms. The same figures for the year 1931 are included for comparison.

TABLE 9.

Year.	“H” Agglutinins.				“O” Agglutinins.			
	Total cases.	Diagnostic rise.	Slight general rise.	Negative.	Total cases.	Titre $\frac{1}{100}$ and over.	Titre $\frac{1}{100}$ to $\frac{1}{1000}$ .	Titre under $\frac{1}{1000}$ .
1931 . .	249	40.1	21.2	38.7	190	15.3	12.1	72.6.
1932 . .	211	59.0	11.5	29.5	213	12.2	15.5	72.3

As was noted last year, the results of tests with “O” emulsions are disappointing, probably due to the fact that the causative organism in a large proportion of the cases belongs to the paratyphoid group and does not react well to “TO” emulsion. “AO” and “BO” emulsions are now in use and figures showing their results will be available next year.

It must be remarked that the “TO” results shown above are not altogether without value from the diagnostic point of view, for while “H” emulsions frequently give positive results when “O” emulsions remain negative, the reverse also holds good in a small proportion of cases.

Thus in the above series, in cases where the “H” results were negative or indefinite, 3.7 per cent. gave an “O” titre of over  $\frac{1}{100}$ , and a further 4.6 per cent. a titre of between  $\frac{1}{100}$  and  $\frac{1}{1000}$ .

The inoculation state remains satisfactory, being as follows when the last return was rendered.

TABLE 10.

	Officers.	Other Ranks.
Strength . . .	2,168	55,102
Number protected	2,031	54,641
Number unprotected	137	461
Percentage protected	93.68	99.16

Table 11 shows the incidence and deaths among protected and unprotected classes. The “strengths” in this table are the average of two half yearly returns, and are therefore approximate only.

The combined British and Indian cases of enteric fevers for the 5 years are as follows:—

	1928	1929	1930	1931	1932
Admissions . . . . .	558	609	501	494	444
Mortality rate . . . . .	8.06	8.54	6.40	7.85	7.21

From this it can be seen that a steady decline has taken place in numbers, but that the case mortality shows little variation.

*Diagnosis.*—No new methods have been adopted for general use, although certain matters are being tested out experimentally.

Blood culture remains the most satisfactory method of diagnosis, the proportion of positives from faeces and urine culture remaining very low.

The following is an analysis of the isolations of organism from cases which were diagnosed by these methods:—

TABLE 8.

	British troops, Officers, women and children.				Indian troops and Followers.			
	Total	Blood culture.	Faeces culture positive		Total	Blood culture.	Faeces culture positive	Urine
		per cent.	per cent.	per cent.		per cent.	per cent.	per cent.
Typhoid . . . . .	102	73.5	34.3	16.6	112	79.5	17.9	16.1
Paratyphoid A. . . . .	27	77.8	18.5	7.4	49	87.8	12.2	4.1
Paratyphoid B. . . . .		50.0	50.0		12	50.0	50.0	
Paratyphoid C. . . . .						100.0		
TOTAL	131	74	30.5	14.5	174	79.4	18.4	11.5

*Total cases—British and Indian.*

Total cases.	Blood Culture.	Faeces Culture.	Urine Culture.
305	77.4%	23.6%	12.8%

In order to minimise the discomforts of the patient, orders have been issued to the effect that when the diagnosis of typhoid or paratyphoid fever is confirmed by the isolation of the causative organism,

TABLE I.

Disease.	British.												Indian.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	1930						1931.						1932.						1930.						1931.						1932.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Actuals.			Ratio per 1,000.			Actuals.			Ratio per 1,000.			Actuals.			Ratio per 1,000.			Actuals.			Ratio per 1,000.			Actuals.			Ratio per 1,000.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.	D.		A.



recent movements", and were of a very severe type, two of the five cases dying (one B. O. R. and one I. O. R.).

Another interesting group of three cases occurred in officers who were shooting in districts where "tick-typhus" is known to be endemic. All were heavily bitten by various arthropods. The disease was very severe, and two of the three cases were fatal.

16 cases, all of a mild type, occurred in one station (Ahmednagar), 13 of them in the last four months of the year.

### Diphtheria.

7. The following are the figures for British troops in the years 1931 and 1932:

TABLE 6.

	Actuals.		Ratios.	
	1931.	1932.	1931.	1932.
Total admissions . . . . .	71	73	1.30	1.30
Deaths . . . . .	1	...	0.02	...
Invalids . . . . .	1	...	0.02	...

The cases were sporadic in incidence and mild in nature.

Investigations are now in progress to determine the most satisfactory methods under Indian conditions for rapid isolation and testing of virulence.

### Enteric Fevers.

8. The incidence of enteric fevers among British and Indian Troops during the years 1930, 1931 and 1932 is shown in Table 7.

*British troops.*—There is an increase from 1931 of six admissions for typhoid fever and seven for paratyphoid A fever, and a decrease of one for paratyphoid B and seven for enteric group, there being an increase of five for the whole group.

The case mortality rates for the whole group for the last three years are:—1930 6.3, 1931 6.0, 1932 8.0.

There is therefore a slight increase both in the incidence and in the severity of the disease.

*Indian troops.*—There is a decrease of 21 admissions for typhoid fever, four for paratyphoid A fever, three for paratyphoid C, and 28 for enteric group, while paratyphoid B fever shows an increase of one. This gives a decrease of 55 cases in the group.

The case mortality rates in each of the last three years are:—1930 6.5, 1931 9.0, 1932 6.6.

The etiology of the condition is, separately, under investigation, in the hope that facts will emerge which will enable more effective preventive measures to be devised.

The admissions for P. U. O. show a decline from 3.6 per 1,000 to 1.9 per 1,000. The figures, however, cannot be considered by themselves but must be taken along with those of diseases for which no definite diagnostic criterion exists, (as, for example, dengue and sandfly fever in non-epidemic stations, "enteric group" fever, etc.), as some medical officers will label a case P. U. O. which others will confidently call, say, dengue or sandfly fever. It is interesting to note that all these conditions have a lower incidence in 1932, suggesting some common factor in the circumstances governing their onset.

### Fever of the Typhus Group.

6. The diagnosis of sporadic cases of this condition is becoming much more common, probably due to a more universal recognition of the symptoms of the disease rather than to an increased incidence, as in the past there is little doubt that many cases of this disease were included in the P. U. O. series.

In all, 34 cases were reported among all ranks and families, British and Indian, entitled to hospital treatment, with 4 deaths.

The symptoms of the cases are fairly constant. The most striking feature is the rash, which, taken in conjunction with the type of fever and certain other signs and symptoms, permits of a fairly definite clinical diagnosis being reached.

The Weil Felix reaction has been positive in a proportion of cases, but hitherto the technique has not been sufficiently standardised to permit of conclusions being drawn therefrom. Efforts are now being made to carry out in all cases a series of tests with "O" emulsion of *B. protens* X 2, X 19, and Kingsbury.

Attempts are also being made to isolate strains of *B. protens* from these cases in the hope that one giving a specific reaction may be discovered.

The question of etiology is of interest. While the general picture of the cases corresponds to Tick Typhus as described by Megaw and others, in the majority of cases it has been impossible to obtain a definite history of tick bite. In many cases, however, there was a relationship between the onset of the disease and recent residence in forest bungalows, camps, etc., which is in keeping with the hypothesis that this is a disease of the wilds, normally occurring in some lower animal which constitutes the reservoir of infection, and conveyed to man by some parasitic arthropod which occasionally selects him as a host. In a few cases there was a suggestive local adenitis. Louse-infection can be definitely excluded in the majority of cases. The question of the vector is receiving special attention.

In a small group of five cases which occurred in one cantonment louse infestation was suspected, although not proved. It was not specifically noted that the patients were lousy, but subsequent investigations revealed this condition in certain of their comrades. These cases showed "no

# PRINCIPAL DISEASES-AFFECTING THE BRITISH ARMY.

## Dengue, Sandfly Fever and Pyrexia of Uncertain Origin.

5. The incidence of these diseases during the last three years was as follows:—

TABLE 5.

Disease.	1930.		1931.		1932.	
	Admissions	Ratio per 1,000.	Admissions	Ratio per 1,000.	Admissions	Ratio per 1,000.
Dengue . . . .	523	9·4	659	11·8	432	7·8
Sandfly fever . .	2,739	49·4	2,203	39·4	2,262	40·9
P. U. O. . . . .	115	2·1	202	3·6	106	1·9

More than 60 per cent. of the cases of dengue come from the garrisons stationed in ports and of these Calcutta as usual supplies the lion's share. There have however been no severe outbreaks, and the admission ratio shows a decline.

Sandfly fever continues to be a source of considerable anxiety. Although the mortality rate is *nil*, and the stay in hospital which this disease occasions is short, the morbidity rate during the season of incidence is high and the incapacitating effect is serious. The majority of cases occur in the North-West Frontier Province and in Northern Punjab, and, by reducing considerably the number of effectives, add greatly to the discomforts and worries of the hot weather.

It will be recalled that in 1925 an investigation was made under the auspices of the Indian Research Fund Association into the problem of sandfly breeding at Landi Kotal, a garrison in the Khyber Pass which usually shows a high incidence of sandfly fever. Extensive breeding grounds were discovered in nullahs which intersect the camp, and methods for their destruction were devised. For the first few years thereafter the sandfly fever incidence dropped, and it appeared that something had been achieved. Of late, however, sandflies and cases of sandfly fever have been as numerous as ever, and this in spite of the fact that the breeding grounds in question are still very effectively treated, and are not now the source of the trouble.

Certain observations suggest that infection is not being acquired in the barrack-rooms, but during night duty while manning the trenches guarding the perimeter. If so, this considerably widens the problem.

The question of the habits and bionomics of the sandfly have again been taken up, with the assistance of the I. R. F. A.,\* and further investigations into the location of the breeding grounds and other practical points of importance are being made, from which it is hoped that good results will accrue.

\* I. R. F. A.—Indian Research Fund Association.

## Women and Children (British Other Ranks).

4,1262 women or 292.3 per 1,000 of the strength were admitted to hospital, compared with 1,395 or 334.4 per 1,000 in 1931.

The principal causes of admission to hospital were:—

Abortion . . . . .	112	Constipation . . . . .	37
Malaria . . . . .	106	No appreciable disease . . . . .	36
Inflammation of tonsils . . . . .	63	Inflammation of areolar tissue . . . . .	36
Inflammation of bronchi . . . . .	47	Appendicitis . . . . .	30
Diarrhoea . . . . .	45	Endometritis . . . . .	30

In addition, 863 women were admitted to hospital for parturition.

2,774 or 642.6 per 1,000 of the strength were treated as out-patients, with an average daily number under treatment of 57.13 or 13.23 per 1,000.

1,999 children or 299.1 per 1,000 of the strength were admitted to hospital compared with 1,896 or 236.4 in 1931.

The principal causes of admission to hospital were:—

Inflammation of the tonsils . . . . .	196	Enteritis . . . . .	64
Inflammation of bronchi . . . . .	177	Constipation . . . . .	58
Malaria . . . . .	161	Diphtheria . . . . .	57
Diarrhoea . . . . .	149	Hypertrophy of the tonsils . . . . .	55
Dysentery . . . . .	139	Pneumonia . . . . .	45
Measles . . . . .	81	Conjunctivitis . . . . .	40
Inflammation of areolar tissue . . . . .	80		

There were 85 deaths giving a ratio of 12.72 per 1,000.

The chief causes were:—

Enteritis . . . . .	9	Inanition . . . . .	6
Dysentery . . . . .		Premature birth . . . . .	5
Pneumonia . . . . .		Measles . . . . .	4
Convulsions . . . . .		Diarrhoea . . . . .	4

4,744 or 709.8 per 1,000 of the strength were treated as out-patients with an average daily number under treatment of 98.30 or 14.71 per 1,000.

TABLE 4.

—	Number of admissions to hospital.	Deaths.	Invalids sent home.	Average constantly sick.
Royal Navy. . . . .	32	..	..	2.27
Royal Air Force (wives and children) . . . . .	65	..	..	2.10
Royal Air Force . . . . .	1,154	7	15	39.60
Parturition (wives) Royal Air Force . . . . .	..	..	..	..
Q. A. I. M. N. S. . . . .	91	3	8	4.41
Wives of Officers (British and Indian Service) . . . . .	322	6	12	10.14
Wives of Officers (British and Indian Service) . . . . .	124	..	..	5.06
Parturition. . . . .				
Children of Officers (British and Indian Service). . . . .	178	12	2	5.36
Royal Indian Marine . . . . .	12	..	..	0.56
Patients not belonging to His Majesty's Regular Troops. . . . .	347	16	1	15.55
Parturition cases of wives of personnel not belonging to His Majesty's Regular Troops. . . . .	29	..	..	1.09

TABLE 3—concl'd.

*Table showing admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India—concl'd.*

	Stations with total admission ratios lower than all-India.				
	Jubbulpore.	Ranikhet.	Lucknow.	Bangalore.	All-India.
Strength	1,566	1,292	2,275	1,384	55,336
All causes—					
Admissions . . .	493·60	477·60	445·30	425·30	581·50
Deaths . . . .	2·55	4·64	7·03	0·72	2·96
Average constantly sick	22·20	32·28	20·32	25·09	
Malaria—					
Admissions . . .	76·00	100·60	14·10	11·60	84·10
Deaths . . . .		0·77			0·13
Sand-fly fever—					
Admissions . . .	10·20		30·80		40·90
Deaths . . . .					
Enteric group of fevers—					
Admissions . . .	0·60	4·60	3·10	0·70	3·40
Deaths . . . .		0·77	0·44		0·25
Dysentery—					
Admissions . . .	25·50	27·90	17·60	18·10	25·00
Deaths . . . .					
Diarrhoea—					
Admissions . . .	12·10	13·20	8·50	10·10	13·20
Deaths . . . .					
Influenza—					
Admissions . . .			11·90		18·80
Deaths . . . .					0·04
Pneumonia (lobar and lobular)—					
Admissions . . .	1·30	2·30	1·80	0·70	4·60
Deaths . . . .		0·77			0·49
Veneral diseases—					
Admissions . . .	37·00	16·30	44·00	50·60	37·70
Deaths . . . .					
Minor septic diseases—					
Admissions . . .	49·80	26·30	51·40	74·40	56·20
Deaths . . . .					
Local injuries—					
Admissions . . .	47·90	51·10	42·20	73·70	58·50
Deaths . . . .			0·89		0·49
Heat-stroke—					
Admissions . . .	0·60		5·70		0·90
Deaths . . . .	0·64		1·76		0·22
Heat-exhaustion—					
Admissions . . .	0·60	0·80	0·90		3·20
Deaths . . . .	0·64				0·11
Sun-stroke—					
Admissions . . .					0·02
Deaths . . . .					

TABLE 3—*contd.*

*Table showing admission and death ratios per 1,000 of the strength for a causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India—contd.*

Stations with total admission ratios lower than all-India.

	Razmak	Secunderabad.	Meerut.	Quetta.	Sialkot.	Poona.
Strength	1,100	2,762	1,919	2,567	1,411	2,535
All causes—						
Admissions . . .	567.80	562.80	546.10	538.40	537.20	532.50
Deaths . . .	0.91	3.62	2.61	3.12	4.25	2.76
Average constantly sick	21.54	29.07	30.45	25.16	22.71	36.51
Malaria—						
Admissions . . .	72.70	26.10	32.80	81.80	81.50	56.40
Deaths . . .		0.36			0.71	...
Sand-fly fever—						
Admissions . . .	1.80		42.20		11.30	35.90
Deaths . . .						...
Enteric group of fevers—						
Admissions . . .	0.90	2.50	4.20	3.10	0.70	1.20
Deaths . . .		0.72		0.39		...
Dysentery—						
Admissions . . .	15.50	50.00	38.60	64.30	24.60	30.00
Deaths . . .						...
Diarrhoea—						
Admissions . . .	16.40	11.90	4.20	2.70	15.60	11.00
Deaths . . .						...
Influenza—						
Admissions . . .	8.20	3.30		65.40	25.50	0.40
Deaths . . .				0.78		
Pneumonia (lobar and lobular)—						
Admissions . . .	8.20	1.80	9.40	3.50	7.10	2.00
Deaths . . .	0.91		...	1.17	0.71	0.89
Venereal diseases—						
Admissions . . .	16.40	43.10	32.80	23.80	22.00	30.80
Deaths . . .	...		...			
Minor septic diseases—						
Admissions . . .	60.00	34.00	50.50	48.70	67.30	39.80
Deaths . . .	...		...			
Local injuries—						
Admissions . . .	36.40	72.00	78.20	51.40	53.20	44.60
Deaths . . .		0.72	0.52	0.39	1.42	0.39
Heat-stroke—						
Admissions . . .		0.40	1.60			
Deaths . . .			...			
Heat-exhaustion—						
Admissions . . .			20.80		4.30	0.40
Deaths . . .					0.71	
Sun-stroke—						
Admissions . . .						
Deaths . . .						

and upwards compared with all-India, are shown in the following tables:—

TABLE 3.

*Table showing admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000 and upwards compared with all-India.*

[illegible]

There were 164 deaths or 2·96 per 1,000 of the strength compared with 2·78 per 1,000 in 1931.

The most important causes of mortality were:—

Local injuries . . . . .	27
Pneumonia . . . . .	27
Enteric group of fevers . . . . .	14
Heat-stroke . . . . .	12
Appendicitis . . . . .	11
Heat-exhaustion . . . . .	6

409 or 7·39 per 1,000 of the strength were sent home as invalids, compared with 544 or 9·74 per 1,000 in 1931.

The principal causes of invaliding to the United Kingdom were:—

	1932.	Increase or Decrease.		1932.	Increase or Decrease.
Pulmonary tuberculosis	44	+ 2	Inflammation of the middle ear . . . . .	15	-39
Mental diseases, other than dementia præcox	37	-11	Tuberculosis, other than pulmonary . . . . .	15	+ 1
Epilepsy . . . . .	23	-15	Fractures . . . . .	14	—
Diseases of joints . . . . .	23	- 1	Diseases of bronchi and bronchioles . . . . .	14	—
Valvular diseases of the heart . . . . .	20	+ 9	Deformities of limbs . . . . .	14	- 2
Injuries, other than fractures . . . . .	19	- 5	Dementia præcox . . . . .	12	-16
Neurasthenia . . . . .	17	+ 5	Diseases of urinary system . . . . .	10	-14

The average number constantly sick in hospital was 1,458·31 or 26·35 per 1,000 of the strength, compared with 1,619·95 or 29·01 per 1,000 in 1931.

The diseases chiefly responsible were:—

Gonorrhœa . . . . .	200·81	Sandfly fever . . . . .	47·67
Malaria . . . . .	128·75	Tonsils . . . . .	45·09
Inflammation of areolar tissue . . . . .	87·64	Soft chancre . . . . .	33·39
Dysentery . . . . .	70·96	Bronchitis . . . . .	31·05
Fractures . . . . .	51·27	Sprain and strain . . . . .	30·34
		Syphilis . . . . .	28·57

87,211 men, or 1,576·0 per 1,000 of the strength were treated as out-patients, with an average daily number under treatment of 1,199·01 or 21·67 per 1,000.

The combined ratio constantly sick in hospital and under treatment as out-patients was 48·02 per 1,000 of the strength, compared with 50·71 in 1931.

The actual loss to the Army in India in working days was 533,741 due to sick in hospital and 438,838 due to sick in barracks, making a total of 972,579 days compared with 1,033,607 in 1931.

The admission and death ratios per 1,000 of the strength for all causes and certain important diseases for stations with a strength of 1,000



## Officers.

2. 463.2 per 1,000 of strength were admitted to hospital during the year, compared with 420.4 in 1931.

The principal causes of sickness were :—

Malaria . . . . .	95	Influenza . . . . .	29
Inflammation of areolar tissue . . . . .	75	Sprain and strain . . . . .	24
Sandy fever . . . . .	66	Concussions . . . . .	22
Dysentery . . . . .	65	Contusion . . . . .	21
Jaundice . . . . .	62	Boils . . . . .	19
Diarrhoea . . . . .	52	Gastritis . . . . .	15
Tonsillitis . . . . .	50	Pharyngitis . . . . .	14
Fractures . . . . .	42	Synovitis . . . . .	13
Appendicitis . . . . .	33	Dengue . . . . .	10

There were 15 deaths giving a ratio of 6.54 per 1,000 compared with 18 and 7.76 per 1,000 in 1931.

The causes of death were injuries (3 cases), typhoid fever (2 cases), pneumonia, enteric group, appendicitis, typhus fever, apoplexy, endocarditis acute, aneurysm, myelitis, tropical abscess and pyelonephritis (one case of each).

The average constantly sick in hospital was 38.75 or 16.88 per 1,000 of strength as compared with 15.11 in the previous year.

1,282 or 558.6 per 1,000 of the strength were treated as out-patients with an average daily number under treatment of 25.39 or 11.06 per 1,000. The total constantly sick due to disease and injury amounted to 27.94 per 1,000.

## Soldiers.

3. 32,177 or 581.5 per 1,000 of the strength were admitted to hospital, compared with 647.0 in 1931 and 580.5 in 1913.

The principal causes of admission to hospital showing the increase or decrease compared with the previous year were :—

	1932.	Increase or Decrease.		1932.	Increase or Decrease.
Malaria . . . . .	4,654	- 1,628	Fractures . . . . .	730	+ 26
Inflammation of the areolar tissue . . . . .	2,334	+ 2	Contusion . . . . .	729	- 27
Sandy fever . . . . .	2,262	+ 59	Synovitis . . . . .	477	- 28
Inflammation of tonsils . . . . .	1,864	- 222	Jaundice . . . . .	476	- 65
Gonorrhoea . . . . .	1,454	- 194	Appendicitis . . . . .	436	+ 57
Dysentery . . . . .	1,385	- 206	Boils . . . . .	435	- 70
Influenza . . . . .	1,038	- 393	Dengue . . . . .	432	- 227
Sprain . . . . .	916	- 77	Inflammation of naso-pharynx . . . . .	423	- 66
Inflammation of bronchi . . . . .	909	- 26	Constipation . . . . .	360	+ 33
Diarrhoea . . . . .	732	- 130	Syphilis . . . . .	330	- 49
			Soft chancre . . . . .	303	- 41

There were 3,955 fewer admissions in 1932 than in the previous year. The biggest drop (1,628) occurred in the malaria admissions, but with few exceptions, all the principal causes of admission shew a decrease.

# ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932.

## VOLUME II.

### SECTION I.

#### ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

(From the Director of Medical Services in India.)

1. General health statistics of the British Army in India during the year 1932 are given in the table below:—

TABLE 1.

1932.	Average strength.	Admissions.		Deaths.		Invalids sent home.		Invalids discharged in India.		Invalids finally discharged in United Kingdom.		Average constantly sick.	
		No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.	No.	Ratio per 1,000.
Officers	2,295	1,063	463.2	15	6.54	63	27.45	...	...	...	...	38.75	16.88
British Other Ranks.	55,386	32,177	581.5	164	2.96	409	7.39	...	...	...	...	1,458.81	26.35
British Other Ranks' wives.	4,317	1,262	292.3	18	4.17	57	13.20	...	...	...	...	41.02	9.64
British Other Ranks' wives parturition.	...	863	...	...	...	...	...	...	...	...	...	33.21	...
British Other Ranks' children.	6,684	1,999	299.1	85	12.72	14	2.09	...	...	...	...	65.61	9.82
Others	...	2,354	...	44	...	38	...	...	...	...	...	86.14	...

The ratios per 1,000 for admissions, deaths and invalids, amongst officers and other ranks for the quinquennial periods 1910-14, 1920-24 and 1925-29, with that for 1930, 1931 and 1932, are given separately for purposes of comparison in the following table:—

TABLE 2.

Periods.	Ratio per 1,000.					
	Admissions.		Deaths.		Invalids.	
	Officers.	Other Ranks.	Officers.	Other Ranks.	Officers.	Other Ranks.
1910-14	567.5	567.2	5.14	4.36	16.30	7.03
1920-24	676.7	791.9	6.71	5.24	20.99	18.91
1925-29	589.9	619.4	5.25	2.90	17.44	18.50
1930	392.3	611.3	5.95	2.75	21.69	8.70
1931	420.4	647.0	7.76	2.78	17.63	9.76
1932	463.2	581.5	6.54	2.96	27.45	7.39

APPENDICES—*concl'd.*SECTION I.—BRITISH ARMY—*concl'd.**Indian Officers and Indian Other Ranks.**Average strength, admissions into Hospital, deaths, numbers invalided and constantly sick.*

TABLE.	PAGE.
Indian Officers and Indian Other Ranks—	
XVI.—India . . . . .	130
XVII.—Northern Command . . . . .	133
XVIII.—Western Command . . . . .	137
XIX.—Eastern Command . . . . .	141
XX.—Southern Command . . . . .	145
XXI.—Burma District . . . . .	149
XXII.—Indian Officers and Indian Other Ranks—Admission ratios (by months) for certain diseases . . . . .	153
XXIII.—Indian Officers and Indian Other Ranks—Admission ratios for certain diseases by stations and districts . . . . .	156
XXIV.—British Officers of the Indian Army—Average strength, admissions, deaths and constantly sick . . . . .	168
XXV.—Indian Officers and Indian Other Ranks—Admission and death ratios for certain diseases by commands . . . . .	172

## TROOPS AND PRISONERS.

XXVI.—Detail of Diseases . . . . .	175
------------------------------------	-----

## SECTION II—concl'd.

*Average strength, admissions into Hospital, deaths, numbers  
invalided and constantly sick.*

PARA.	PAGE.
37. Venereal Diseases . . . . .	69
38. Other Diseases due to Infection . . . . .	69
39. Diseases of the Circulatory System . . . . .	70
40. Diseases of Respiratory System . . . . .	70
41. Diseases of the Digestive System . . . . .	70
42. Minor Septic Diseases . . . . .	71
43. Local Injuries . . . . .	71
44. Followers . . . . .	71
45. Recruiting . . . . .	72

## APPENDICES.

### SECTION I.—BRITISH ARMY.

TABLE.	PAGE.
A.—Stations by Commands and Independent Districts . . . . .	74
<i>Average strength, admissions into Hospital, deaths numbers invalided and constantly sick.</i>	
Warrant Officers, N. C. Os. and Men—	
I.—India . . . . .	76
II.—Northern Command . . . . .	79
III.—Western Command . . . . .	83
IV.—Eastern Command . . . . .	87
V.—Southern Command . . . . .	91
VI.—Burma District . . . . .	95
VII.—British Other Ranks—Admission ratios (by months) for certain diseases . . . . .	99
VIII.—British Other Ranks—Admission ratios for certain diseases by stations and districts . . . . .	100
IX.—British Officers (British Services) . . . . .	110
X.—Wives of Warrant Officers, N. C. Os. and Men . . . . .	114
XI.—Children of Warrant Officers, N. C. Os. and Men . . . . .	118
XII.—British Other Ranks—Admissions and death rates for certain diseases by Commands . . . . .	122
XIII.—Vaccination performed in the British and Indian Armies during 1932—Officers and Other Ranks . . . . .	124
XIV.—Vaccination performed in the Families—British Army during 1932	125
XV.—Vaccination performed in the Families—Indian Army during 1932	125

### SECTION II.—INDIAN ARMY.

B.—Stations by commands and independent districts . . . . .	128
---	-----

# SECTION I—concl'd.

*Average strength admissions into Hospital, deaths, numbers  
invalided and constantly sick.*

PARA.	PAGE.
22. Hygiene—Accommodation . . . . .	40
Water-Supplies . . . . .	40
Rations . . . . .	43
Disinfection and Disinfestation . . . . .	44
Conservancy . . . . .	44
Mother and Child Welfare . . . . .	44
23. Pathology . . . . .	44
Dysentery . . . . .	45
Sandfly fever . . . . .	45
Vitamins . . . . .	45
Kahn reaction . . . . .	45
Plague . . . . .	45
"Tick" typhus . . . . .	45
24. Dental Treatment . . . . .	45

## ANNEXURES.

I.—The relation of Malaria incidence to meteorological conditions, with a summary of conclusions come to in regard to the relations between meteorological conditions and Malaria incidence among British troops . . . . .	47
II.—Army Headquarters, India, Medical Directorate, Circular regarding the differential diagnosis of Malaria . . . . .	49
III.—Excerpts from various recent Army Headquarters circulars regarding the new synthetic anti-Malaria drugs . . . . .	53

## SECTION II.

### ON THE HEALTH OF THE INDIAN ARMY IN INDIA.

25. General . . . . .	56
26. Officers . . . . .	56
27. Soldiers . . . . .	57

#### *Principal Diseases affecting the Indian Army.*

28. Dengue . . . . .	64
29. Dysentery, Diarrhœa and Colitis . . . . .	64
30. Enteric Group of Fevers . . . . .	65
31. Malaria . . . . .	66
32. Pneumonia . . . . .	68
33. Pyrexia of Uncertain Origin . . . . .	68
34. Sandfly Fever . . . . .	68
35. Small-pox . . . . .	69
36. Tuberculosis . . . . .	69

# ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932.

## VOLUME II.

### TABLE OF CONTENTS.

#### SECTION I.

#### ON THE HEALTH OF THE BRITISH ARMY IN INDIA.

PARA.	PAGE.
1. General . . . . .	1
2. Officers . . . . .	2
3. Soldiers . . . . .	2
4. Women and children (British Other Ranks) . . . . .	7
<i>Principal Diseases affecting the British Army.</i>	
5. Dengue, Sandfly Fever and Pyrexia of uncertain origin . . . . .	8
6. Fever of the Typhus Group . . . . .	9
7. Diphtheria . . . . .	10
8. Enteric Fevers—	
British Troops . . . . .	10
Indian Troops . . . . .	10
9. Dysentery, Diarrhoea and Hepatitis . . . . .	14
Carriers . . . . .	16
Tropical Abscess of Liver and Hepatitis . . . . .	18
10. Malaria . . . . .	19
Anti-malarial measures . . . . .	21
11. Small-pox . . . . .	32
12. Tuberculosis . . . . .	32
13. Undulant Fever . . . . .	33
14. Venereal Diseases . . . . .	33
15. Diseases of the Respiratory System . . . . .	34
16. Diseases of the Digestive System . . . . .	34
17. Deformities of the Foot . . . . .	35
18. Diseases of the Areolar Tissue and Local Injuries . . . . .	35
19. Effects of Heat . . . . .	35
20. Field Operations . . . . .	36
21. Hospitals and Special Departments—General . . . . .	36
Surgery . . . . .	36
Radiology . . . . .	38
Ophthalmology . . . . .	38
Ear, Nose and Throat Departments . . . . .	39

**Government of India Publications are obtainable from the Manager of  
Publications, Civil Lines, Delhi, and from the following Agents :—  
EUROPE.**

**OFFICE OF THE HIGH COMMISSIONER FOR INDIA, India House, Aldwych, LONDON, W. C. 2.**

**And at all Booksellers.**

**INDIA AND CEYLON : Provincial Book Depôts.**

**MADRAS** :—Superintendent, Government Press, Mount Road, Madras.  
**BOMBAY** :—Superintendent, Government Printing and Stationery, Queen's Road, Bombay.  
**SIND** :—Library attached to the Office of the Commissioner in Sind, Karachi.  
**UNITED PROVINCES OF AGRA AND OUDH** :—Superintendent of Government Press, United Provinces of Agra and Oudh, Allahabad.  
**PUNJAB** :—Superintendent, Government Printing, Punjab, Lahore.  
**BERMA** :—Superintendent, Government Printing, Burma, Rangoon.  
**CENTRAL PROVINCES AND BHOJAR** :—Superintendent, Government Printing, Central Provinces, Nagpur.  
**ASSAM** :—Superintendent, Assam Secretariat Press, Shillong.  
**BIHAR AND ORISSA** :—Superintendent, Government Printing, Bihar and Orissa, P. O. Gulzarbagh, Patna.  
**NORTH-WEST FRONTIER PROVINCE** :—Manager, Government Printing and Stationery, Peshawar.

Thacker, Spink & Co., Ltd., Calcutta and Simla.  
W. Newman & Co., Ltd., Calcutta.  
S. K. Lahiri & Co., Calcutta.  
The Indian School Supply Depôt, 309, Bow Bazar Street, Calcutta.  
Butterworth & Co. (India), Ltd., Calcutta.  
M. C. Sarker & Sons, 15, College Square, Calcutta.  
Standard Literature Company, Limited, Calcutta.  
Association Press, Calcutta.  
Chakraverty, Chatterjee & Co., Ltd., 13, College Square, Calcutta.  
The Book Company, Calcutta.  
James Murray & Co., 12, Government Place, Calcutta.  
(For Meteorological Publications only.)  
Ray Chandrahry & Co., 98-5, Ashutosh Mukherji Road, Calcutta.  
Scientific Publishing Co., 9, Taltola Lane, Calcutta.  
Chatterjee & Co., 3-1, Bacharam Chatterjee Lane, Calcutta.  
Standard Law Book Society, 5, Hastings Street, Calcutta.  
The Hindu Library, 3, Nandalal Mullick Lane, Calcutta.  
Kamala Book Depôt, Ltd., 13, College Square, Calcutta.  
The Pioneer Book Supply Co., 20, Shib Narain Das Lane, Calcutta.  
P. C. Sarker & Co., 2, Shama Charan De Street, Calcutta.  
K. Bengali Flying Club, Dum Dum Cantt.  
Kali Charan & Co., Municipal Market, Calcutta.  
N. M. Roy Chowdhury & Co., 11, College Square, Calcutta.  
Gramita Mandir, Cuttack.  
B. C. Basak, Esq., Proprietor, Albert Library, Dacca.  
Higginbothams, Madras.  
Rochouse and Sons, Madras.  
G. A. Nateson & Co., Publishers, George Town, Madras.  
P. Varadachary & Co., Madras.  
City Book Co., Madras.  
Law Publishing Co., Mylapore, Madras.  
The Booklover's Resort, Talked, Trivandrum, South India.  
E. M. Gopalakrishna Kone, Pudukmandapam, Madras.  
Central Book Depôt, Madras.  
Vijapur & Co., Vizagapatnam.  
Thacker & Co., Ltd., Bombay.  
D. B. Taraporevala & Sons & Co., Bombay.  
Ram Chandra Govind & Sons, Kalbadevi Road, Bombay.  
N. M. Tripathi & Co., Booksellers, Princess Street, Kalbadevi Road, Bombay.  
New and Secondhand Bookshop, Kalbadevi Road, Bombay.  
J. M. Pandia & Co., Bombay.  
A. H. Wheeler & Co., Allahabad, Calcutta and Bombay.  
Bombay Book Depôt, Girgaon, Bombay.  
Bennett, Coleman & Co., Ltd., The Times of India Press, Bombay.  
The Popular Book Depôt, Bombay.  
Lawrence & Mayo, Ltd., Bombay.  
The Manager, Oriental Book Supplying Agency, 15, Shukrawar, Poona City.  
Rama Krishna Bros., Opposite Bishrambag, Poona City.  
S. F. Bookstall, 21, Budhwar, Poona.  
The International Book Service, Poona 4.  
Mangaldas & Sons, Booksellers and Publishers, Bhaga Talao, Surat.  
The Students Own Book Depôt, Dharwar.  
Shri Shankar Karnataka Pustaka Bhandara, Malanaddi, Dharwar.

The English Book Depôt, Ferozepore.  
Frontier Book & Stationery Co., Rawalpindi.  
Hosenbhoy Karim and Sons, Karachi.  
The English Bookstall, Karachi.  
Rose & Co., Karachi.  
Keale & Co., Karachi.  
Ram Chander & Sons, Ambala, Kasauli.  
The Standard Bookstall, Quetta and Lahore.  
U. P. Malhotra & Co., Quetta.  
J. Ray & Sons, 43, K. & L, Edwardes Road, Rawalpindi, Murree and Lahore.  
The Standard Book Depôt, Lahore, Nainital, Mussoorie, Dalhousie, Ambala Cantonment and Delhi.  
The North India Christian Tract and Book Society, 18, Olive Road, Allahabad.  
Ram Narain Lal, Katra, Allahabad.  
"The Leader", Allahabad.  
The Indian Army Book Depôt, Dayalbagh, Agra.  
The English Book Depôt, Taj Road, Agra.  
Gaya Prasad & Sons, Agra.  
Narayan & Co., Meerton Road, Cawnpore.  
The Indian Army Book Depôt, Jullundur City—Daryaganj, Delhi.  
Manager, Newal Kishore Press, Lucknow.  
The Upper India Publishing House, Ltd., Literature Palace, Ammuddaua Park, Lucknow.  
Rai Sahib M. Gulab Singh & Sons, Muftid-Am Press, Lahore and Allahabad.  
Rama Krishna & Sons, Booksellers, Anarkali, Lahore.  
Students' Popular Depôt, Anarkali, Lahore.  
The Proprietor, Punjab Sanskrit Book Depôt, Saidmulla Street, Lahore.  
The Insurance Publicity Co., Ltd., Lahore.  
The Punjab Religious Book Society, Lahore.  
The Commercial Book Co., Lahore.  
The University Book Agency, Kachari Road, Lahore.  
Manager of the Imperial Book Depôt, 83, Chandni Chawki Street, Delhi.  
J. M. Jaina & Bros., Delhi.  
Fono Book Agency, New Delhi and Simla.  
Oxford Book and Stationery Company, Delhi, Lahore, Simla, Meerut and Calcutta.  
Mohandal Dossabhai Shah, Rajkot.  
Suptd., American Baptist Mission Press, Rangoon.  
Burma Book Club, Ltd., Rangoon.  
S. C. Talukdar, Proprietor, Students & Co., Cooch Behar.  
The Manager, The Indian Book Shop, Benares City.  
Nandkishore & Bros., Chowk, Benares City.  
The Srivilliputtur Co-operative Trading Union, Ltd., Srivilliputtur (S. I. R.).  
Raghunath Prasad & Sons, Patna City.  
The Students' Emporium, Patna.  
K. L. Mathur & Bros., Guzli, Patna City.  
Kamala Book Stores, Bankipore, Patna.  
G. Banerjee and Bros., Ranchi.  
M. C. Kothari, Rajpura Road, Baroda.  
B. Parikh & Co., Baroda.  
The Hyderabad Book Depôt, Chaderghat, Hyderabad (Deccan).  
S. Krishnaswamy & Co., Teppakulam P. O., Trichinopoly Fort.  
Standard Book and Map Agency, Book Sellers and Publishers, Ballygunge.  
Karnataka Publishing House, Bangalore City.  
Bheema Sons, Fort, Bangalore City.  
Superintendent, Bangalore Press, Lake View, Mysore Road, Bangalore City.

**AGENT IN PALESTINE :—Steinmatsky, Jerusalem.  
 \* Agents for publications on aviation only.**

N. P. H-A. R. 2/32.

**ANNUAL REPORT**  
**OF THE**  
**PUBLIC HEALTH COMMISSIONER**  
**WITH THE GOVERNMENT OF INDIA**  
**FOR 1932**



**Volume II**





TABLE I.—DETAILS OF DISEASES—*concl'd.*

	Admissions.	Deaths.
<i>Diseases of the Urinary organs.</i>		
Acute nephritis . . .	128	10
Chronic nephritis . . .	86	19
Cystitis . . .	38	
Calculus of bladder . .	1	
Hæmaturia . . .	7	
Other diseases of the urinary system	159	
<i>General Injuries.</i>		
Effects of heat due to climatic (heat exhaustion) .	38	
Heat-stroke . . . . .	227	51
Sun-stroke . . . . .	37	2
Other general injuries	108	
<i>Local Injuries.</i>		
Burns and scalds . . .	233	1
Abrasions . . . . .	251	..
Wounds, gun shot . . .	27	1
General wounds . . . .	2,109	19
Contusion . . . . .	562	3
Sprain and strain . . .	190	..
Fracture of bones and cartilages	200	8
Dislocation and displacement	16	..
Injuries self-inflicted . .	..	1
Other local injuries . . .	625	9
<i>Tumours and Cysts.</i>		
Carcinoma . . . . .	1	1
New growths, non-malignant	19	1
Cysts . . . . .	43	1
<i>Poisons.</i>		
Arsenic . . . . .	2	..
Alcoholism . . . . .	1	1
Vaccine and sera	16	1
Snakes . . . . .	4	..
Vegetable poisons . . . .	154	1
All other poisons . . . .	8	2
<i>Diseases due to Animal Parasites.</i>		
Ankylostomum duodenale	2,793	16
Ascaris lumbricoides . .	25	..
Guinea worm . . . . .	113	..
Taenia solium . . . . .	29	..
Other intestinal parasites .	19	..
All other animal parasites	282	..
No appreciable disease . .	26	26
N. Y. D. other cases . . .	17	..
<b>All causes . . . . .</b>		

TABLE I.—DETAILS OF DISEASES—*contd.*

	Admissions.	Deaths.
<i>Diseases of the Male Organs of Generation.</i>		
Phimosis . . . . .	87	
Paraphimosis . . . . .	13	
Balanitis . . . . .	3	
Urethritis . . . . .	22	
Stricture of the urethra . . . . .	30	
Urethral fistula . . . . .	3	
Hydrocele of tunica-vaginalis . . . . .	195	
Epididymitis . . . . .	3	
Other diseases of the male organs of generation . . . . .	342	
<i>Diseases of the Female Organs of Generation.</i>		
Pelvic peritonitis . . . . .	1	
Displacements and disorders of the uterus . . . . .	1	
Dysmenorrhœa . . . . .	3	
Menorrhagia . . . . .	4	
Metrorrhagia . . . . .	2	
Abortion . . . . .	9	
Other diseases peculiar to women . . . . .	42	
Affections consequent on pregnancy and parturition . . . . .		
<i>Diseases of the Organs of Locomotion.</i>		
Osteo-myelitis . . . . .	3	
Periostitis . . . . .	6	
Arthritis . . . . .	135	
Synovitis . . . . .	182	
Other diseases of joints . . . . .	216	12
Myalgia . . . . .	344	
Other deformities of the limbs . . . . .	48	
Other diseases of the organs of locomotion . . . . .	151	
<i>Diseases of the Areolar Tissue.</i>		
Cellulitis . . . . .	802	4
Abscess . . . . .	3,125	4
Ulcer . . . . .	2,067	1
Boil . . . . .	1,313	1
Carbuncle . . . . .	26	1
Other diseases of the areolar tissue . . . . .	111	4
<i>Diseases of the Skin.</i>		
Dermatitis . . . . .	36	
Urticaria . . . . .	140	
Impetigo . . . . .		
Eczema . . . . .	464	
Psoriasis . . . . .	7	
Scabies . . . . .	1,046	
Tinea . . . . .	152	
Acne . . . . .	1	
Prickly heat . . . . .	4	
Whitlow . . . . .	267	
Other diseases of the skin . . . . .	341	

TABLE I.—DETAILS OF DISEASES—*contd.*

	Admissions.	Deaths.
<i>Diseases of the Respiratory System.</i>		
Asthma . . . . .	851	21
Bronchitis . . . . .	3,601	28
Empyema . . . . .	5	
Laryngitis . . . . .	32	1
Pleurisy . . . . .	254	8
Pneumonia . . . . .	2,060	428
Pulmonary tuberculosis . . . . .	939	269
Other diseases of the respiratory system . . . . .	454	12
<i>Diseases of the Teeth and Gums.</i>		
Caries of the dentine cement and enamel . . . . .	77	
Gum-boil . . . . .	330	
Pyorrhœa alveolaris . . . . .	69	
Other diseases of the teeth and gums . . . . .	106	
<i>Diseases of the Digestive System.</i>		
Stomatitis . . . . .	146	
Tonsillitis . . . . .	223	
Diseases of the pharynx and œsophagus . . . . .	217	1
Gastritis . . . . .	128	3
Indigestion . . . . .	1,085	
Enteritis . . . . .	390	17
Colitis . . . . .	4,149	25
Fistula in ano . . . . .	40	
Hernia . . . . .	97	2
Intestinal obstruction . . . . .	14	8
Appendicitis . . . . .	115	4
Sprue . . . . .	20	1
Hæmorrhoids . . . . .	824	
Diarrhœa . . . . .	3,626	32
Constipation . . . . .	638	1
Colic . . . . .	789	1
Acute hepatitis . . . . .	47	1
Abscess of the liver . . . . .	43	3
Cirrhosis of the liver . . . . .	28	13
Jaundice, obstructive . . . . .	1,009	9
Cholecystitis including gallstones . . . . .	10	2
Other diseases of the digestive system . . . . .	912	46
<i>Diseases due to Disorders of Nutrition or of Metabolism.</i>		
Scurvy . . . . .	12	
Beri-beri . . . . .	49	
Gout . . . . .	12	
Diabetes mellitus . . . . .	68	
Other diseases due to disorders of nutrition or of metabolism . . . . .	28	

TABLE I.—DETAILS OF DISEASES—*contd.*

	Admissions.	Dea
<i>Mental Diseases.</i>		
Feeble-mindedness . . . . .	3	..
Dementia præcox . . . . .	25	4
Mania . . . . .	39	1
Melancholia . . . . .	27	..
Delusional of insanity . . . . .	1	..
Other mental diseases . . . . .	24	1
<i>Diseases of the Eye.</i>		
Cataract . . . . .	19	..
Conjunctivitis . . . . .	869	1
Keratitis . . . . .	13	..
Errors of refraction . . . . .	1	..
Blepharitis . . . . .	4	..
Glaucoma . . . . .	10	..
Iritis . . . . .	18	..
Trachoma . . . . .	77	..
Other diseases of the eye . . . . .	431	..
<i>Diseases of the Ear.</i>		
Inflammation of external ear . . . . .	138	..
Diseases of the middle ear . . . . .	98	..
Diseases of the mastoid process . . . . .	41	..
Other diseases of the ear . . . . .	84	..
<i>Diseases of the Nose.</i>		
Diseases of the mucous membrane . . . . .	128	..
Other diseases of the nose . . . . .	98	..
<i>Diseases of the Circulatory System.</i>		
Disordered action of the heart . . . . .	4	1
Diseases of the heart valves . . . . .	182	31
Diseases of blood vessels . . . . .	2	..
Other circulatory diseases . . . . .	160	41
<i>Diseases of the Blood.</i>		
Anæmia . . . . .	505	41
Debility . . . . .	856	21
Other blood diseases . . . . .	11	1
<i>Diseases of the Spleen.</i>		
Diseases of the spleen . . . . .	235	
<i>Diseases of the Lymphatic System.</i>		
Inflammation of the lymphatic glands . . . . .	290	
Inflammation of the lymphatic vessels . . . . .	56	
Other diseases of the lymphatic system . . . . .	67	
<i>Diseases of Glands of Internal Secretion.</i>		
Goitre . . . . .	1	
Other diseases of glands of internal secretion . . . . .	10	
<i>Diseases of the Breast.</i>		
Inflammation . . . . .	7	
Other diseases of the breast . . . . .	27	

TABLE I.—DETAILS OF DISEASES.

Jail population of India .

. 163,575

	Admissions.	Deaths.
<i>Diseases caused by Infection.</i>		
Blackwater fever . . . .	1	
Chicken-pox . . . . .	652	
Cholera . . . . .	26	
Dengue . . . . .	245	
Diphtheria . . . . .	2	1
Dysentery . . . . .	7,080	120
Enteric fever . . . . .	453	49
Enteritis infective . . . .	227	..
Erysipelas . . . . .	76	13
Gangrene, acute infective . .		4
Influenza . . . . .	5,554	29
Jaundice spirochaetal . . .	25*	8*
Kala-azar . . . . .	336	14
Leprosy . . . . .	193	7
Malaria . . . . .	26,053	112
Measles . . . . .	84	2
Meningococcal infection . .	26	3
Mumps . . . . .	2,927	..
Plague . . . . .	2	2
Pyæmia . . . . .	6	4
Pyrexia of uncertain origin	2,151	8
Rabies . . . . .	7	3
Relapsing fever . . . . .	1	..
Rheumatic fever . . . . .	594	6
Sandfly fever . . . . .	269	2
Septicæmia . . . . .	9	7
Smallpox . . . . .	86	5
Tetanus . . . . .	4	2
Other tubercular diseases	219	44
Typhus fever . . . . .	1	
Syphilis . . . . .	791	
Gonorrhœa . . . . .	583	
Soft chancre . . . . .	169	
Other diseases caused by infection	69	
<i>Diseases of the nervous system.</i>		
Aphasia . . . . .	1	
Cerebral hæmorrhage . . . .	6	
Diseases of the spinal cord	2	
Epilepsy . . . . .	164	2
Angitis . . . . .	14	12
Neuralgia . . . . .	229	3
Neuritis . . . . .	33	1
Neurasthenia . . . . .	4	..
Other diseases of the nervous system . . . .	297	24

\* Weil's disease.

TABLE H.—ADMISSIONS FROM ENTERIC FEVER, MALARIA, PYREXIA OF UNCERTAIN ORIGIN, CHOLERA, DYSENTERY AND  
DIARRHOEA BY MONTHS—*contd.*

		ENTERIC FEVER.												
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
India		5	14	32	33	56	25	42	60	82	54	33	17	453
N. W. I. P.		..	..	1	1	6	3	4	4	4	..	2	2	27
Punjab		..	..	4	8	17	3	4	4	4	3	2	3	52
U. P.		..	4	4	10	15	9	5	7	12	10	3	2	81
B. & O.		..	2	5	2	..	1	4	3	18	10	7	1	60
Bengal		1	2	1	..	1	..	6	8	9	2	8	3	41
C. P.		1	..	1	..	..	..	1	..	..	..	..	..	3
Bombay		..	4	1	7	4	3	3	16	22	9	4	1	74
Madras		1	1	6	2	2	1	3	6	5	3	2	3	35
Assam		..	..	..	..	2	..	1	1	..	..	1	..	5
Burma		2	..	5	2	7	2	10	8	6	5	3	2	52
Andamans		..	..	..	..	1	3	..	1	3	2	1	..	11

## MALARIA.

India	1,876	1,368	1,723	1,923	1,983	2,045	2,376	2,606	2,754	3,012	2,694	1,898	26,053
N. W. F. P.	134	111	158	198	181	194	150	150	233	371	182	87	2,149
Punjab	522	299	376	383	451	442	443	652	694	656	566	406	5,680
U. P.	236	278	299	440	493	401	410	546	779	699	425	258	5,234
B. & O.	50	90	180	200	199	176	249	226	78	116	88	58	1,714
Bengal	246	225	275	268	243	317	370	417	411	502	679	571	4,524
C. P.	13	10	22	24	19	20	33	48	23	38	23	23	296
Bombay	136	173	162	149	133	118	213	224	264	303	320	251	2,460
Madras	29	16	20	14	13	9	13	7	10	15	16	14	176
Assam	31	7	23	34	47	73	109	72	65	79	69	29	633
Burma	34	35	39	32	25	45	61	29	43	40	44	33	471
Andamans	121	81	96	126	120	203	280	294	162	193	194	123	1,503

### PYREXIA OF UNCERTAIN ORIGIN.

[illegible]

TABLE H.—ADMISSIONS FROM ENTERIC FEVER, MALARIA, PYREXIA OF UNCERTAIN ORIGIN, CHOLERA, DYSENTERY AND DIARRHOEA BY MONTHS.

CHOLERA.											
Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec. Total.
India	1	2	2	1	3	7	7	1	1	2	28
N.W.F.P.	..	..	..	..	..	..	..	..	..	..	..
Punjab	..	..	..	..	..	..	..	..	..	..	..
U.P.	1	1	1	..	..	1	1	1	..	..	6
B. & O.	..	..	..	..	..	..	..	..	..	..	7
Bengal	..	..	..	1	2	6	..	..	..	..	6
C.P.	..	..	1	..	..	..	..	..	..	..	5
Bombay	..	..	..	..	..	..	..	..	..	..	..
Madras	..	..	..	..	..	..	..	..	..	..	..
Assam	..	..	..	..	..	..	..	..	..	..	..
Burma	..	..	..	..	..	..	..	..	..	..	..
Andamans	..	..	..	..	..	..	..	..	..	..	..
DYSENTERY.											
India	365	360	317	360	337	313	319	339	533	534	380 7,980
N.W.F.P.	4	4	5	14	18	14	13	15	11	8	7 119
Punjab	35	39	42	37	79	60	49	117	115	90	28 717
U.P.	61	43	30	34	61	50	52	132	94	46	83 733
B. & O.	24	88	136	216	210	99	221	165	145	116	59 1,723
Bengal	82	55	61	90	72	74	112	164	196	120	71 966
C.P.	2	3	5	14	6	5	33	51	44	7	10 201
Bombay	39	46	69	81	67	60	140	157	148	48	51 976
Madras	93	33	44	33	46	59	70	46	56	34	55 54
Assam	18	12	24	54	38	20	37	68	42	40	15 495
Burma	23	8	16	13	25	59	87	39	56	27	39 358
Andamans	2	1	5	3	5	4	8	10	9	4	8 67
DIARRHOEA.											
India	205	202	345	354	334	340	427	435	338	333	150 3,636
N.W.F.P.	2	5	3	10	3	9	1	5	4	4	5 90
Punjab	28	28	23	32	51	55	46	59	32	11	14 441
U.P.	25	45	47	80	42	60	63	96	29	32	12 571
B. & O.	62	58	132	132	89	43	96	74	78	64	80 959
Bengal	50	83	123	113	74	94	102	71	62	47	49 953
C.P.	2	2	4	4	4	6	32	34	17	2	3 117
Bombay	20	20	35	40	58	56	97	69	49	38	24 555
Madras	1	2	1	2	5	5	1	2	3	2	2 21
Assam	9	8	6	18	16	7	10	3	9	17	5 107
Burma	3	4	2	4	5	8	6	2	1	4	1 41
Andamans	5	3	1	8	2	1	3	2	1	9	4 39



TABLE G.—ADMISSION AND DEATH RATES.

	N. W. F. P.	Tanjah.	U. P.	B. & O.	Bengal.	C. P.	Bombay.	Madras.	Assam.	Burma.	India.*	Andamans.	Indla(f)†
-Average Annual Strength	7,964	21,012	30,703	12,032	10,931	4,080	10,428	13,257	3,809	21,434	156,152	7,423	103,575
-Consolidated Risk Rate—													
(a) Excluding subsidiary jails and lock-ups.	33.1	22.1	21.2	32.8	37.8	11.4	18.7	18.0	27.8	11.4	22.6	27.2	22.8
(b) Including subsidiary jails and lock-ups.	31.1	21.1	21.2	30.6	41.3	11.0	19.8	10.7	27.8	10.6	23.3	..	23.9
-Admission Rate—													
(a) Excluding subsidiary jails and lock-ups.	729.7	801.9	537.7	674.5	1,101.1	344.4	536.3	306.4	602.3	315.4	603.4	520.7	599.7
(b) Including subsidiary jails and lock-ups.	710.0	785.3	537.7	733.6	1,427.8	329.4	647.2	376.4	602.3	312.4	679.7	..	673.2
-Death Rate—													
(a) Excluding subsidiary jails and lock-ups.	11.7	13.2	9.3	12.7	13.0	3.3	7.1	8.1	18.7	11.0	10.7	23.2	11.2
(b) Including subsidiary jails and lock-ups.	11.2	12.3	9.3	12.5	10.5	3.1	7.1	7.2	18.7	11.1	10.2	..	10.6
-Causes—													
Cholera	..	0.1	..	0.2	0.1	..	..	..	..	..	..	..	..
Smallpox	..	0.1	0.3	0.7	0.2	..	0.3	0.1	0.3	0.4	0.3	0.4	0.3
Enteric fever	..	0.4	0.5	0.4	0.5	1.0	1.2	0.2	0.5	0.5	0.5	0.1	0.7
Malaria	..	..	..	..	..	..	..	..	..	..	..	..	..
Sandfly fever	..	..	..	..	..	..	..	..	..	..	..	..	..
Pyæmia of uncertain origin	..	..	..	..	..	..	..	..	..	..	..	..	..
Tubercle of the lungs	2.0	2.1	1.2	2.7	1.6	1.0	0.7	1.4	3.4	2.3	1.7	1.3	0.6
Respiratory diseases	0.3	4.3	2.7	3.0	1.0	0.8	1.0	3.9	3.9	1.3	2.6	3.0	2.6
Dysentery	0.1	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.7	0.4
Diarrhoea	0.1	0.3	0.4	1.2	0.9	1.0	0.3	0.5	3.9	1.1	0.7	1.2	0.7
Diphtheria	..	..	..	..	..	..	..	..	..	..	..	..	..
Diarrhoea	..	..	..	..	..	..	..	..	..	..	..	..	..
Hepatic abscess	..	..	..	..	..	..	..	..	..	..	..	..	..
Amoebic dysentery	..	..	..	..	..	..	..	..	..	..	..	..	..
Amoebic dysentery	..	..	..	..	..	..	..	..	..	..	..	..	..
Phagedæna, ulcers and gangrenæ.	..	..	..	..	..	..	..	..	..	..	..	..	..

\* Excluding Andamans.

(f) Including Andamans.

TABLE F.—SICKNESS STATISTICS OF CONVICTS ONLY ARRANGED ACCORDING TO DURATION OF CONFINEMENT.

			Not exceeding six months.	Above six months and not exceed- ing one year.	Above one year and not exceed- ing two years.	Above two years and not exceed- ing three years.	Above three years and not exceed- ing seven years.	Above seven years.	Total.
1923	District Jails	Average Popn.	22,490	11,645	8,748	5,031	3,747	1,305	52,451
		Deaths	269	170	91	98	62	28	688
	Central Jails	Rate per 1,000	13.3	14.6	11.3	7.5	16.5	20.1	18.1
		Average Popn.	14,977	12,492	10,205	8,890	11,950	6,600	64,325
1929	District Jails	Deaths	180	138	178	112	128	40	586
		Rate per 1,000	12.0	11.0	17.4	12.8	19.5	9.0	13.8
	Central Jails	Average Popn.	21,010	11,824	8,640	5,898	3,869	1,115	51,846
		Deaths	302	128	119	109	212	22.4	713
1930	District Jails	Rate per 1,000	14.4	10.7	13.8	10.9	21.2	22.4	18.7
		Average Popn.	14,287	11,682	11,108	9,278	9,262	8,468	64,005
	Central Jails	Deaths	180	145	133	135	230	93	966
		Rate per 1,000	12.6	12.5	16.5	14.5	24.8	11.0	15.1
1931	District Jails	Average Popn.	20,071	12,442	9,224	5,353	3,430	1,297	61,047
		Deaths	308	127	138	60	63	36	727
	Central Jails	Rate per 1,000	10.2	10.0	13.9	11.2	19.3	29.3	11.7
		Average Popn.	17,179	12,116	11,403	8,911	8,915	9,095	67,609
1932	District Jails	Deaths	224	114	164	106	170	100	878
		Rate per 1,000	12.6	9.4	13.5	11.0	19.3	11.0	12.9
	Central Jails	Average Popn.	21,090	11,438	8,168	5,174	2,887	1,108	50,730
		Deaths	338	147	124	44	67	21	721
1933	District Jails	Rate per 1,000	15.4	12.4	15.2	8.5	20.1	18.1	14.4
		Average Popn.	15,092	11,694	10,387	8,894	8,937	8,762	68,796
	Central Jails	Deaths	220	106	120	89	142	83	772
		Rate per 1,000	15.2	9.1	13.6	9.1	16.9	9.5	12.1
1934	District Jails	Average Popn.	26,794	13,981	8,277	4,822	2,774	1,093	57,601
		Deaths	335	136	91	44	48	25	679
	Central Jails	Rate per 1,000	12.6	9.8	11.0	9.1	17.3	22.9	11.8
		Average Popn.	19,316	13,891	11,898	10,033	9,900	9,381	74,889
1935	District Jails	Deaths	284	138	133	76	111	74	708
		Rate per 1,000	12.1	9.9	11.2	7.3	11.2	7.9	10.2
	Central Jails	Average Popn.	23,416	13,891	11,898	10,033	9,900	9,381	74,889
		Deaths	284	138	133	76	111	74	708

TABLE E.—SICKNESS STATISTICS OF CONVICTS ONLY.

	1923.			1922.			1920.			1921.			1922.		
	Average popula- tion.	Rate per 1,000.	D	Average popula- tion.	Rate per 1,000.	D	Average Popula- tion.	Rate per 1,000.	D	Average popula- tion.	Rate per 1,000.	D	Average popula- tion.	Rate per 1,000.	D
Total	88,413 92,299	469.7 602.9	14.9 13.2	84,085 91,945	497.5 510.5	15.1 14.0	64,554 63,007	575.5 607.2	13.4 11.5	68,068 40,189	505.7 678.9	11.7 13.9	76,793 55,762	431.7 736.5	10.0 11.6
N. W. P. . .	3,857	469.9	17.5	3,519	371.7	11.9	3,764	605.2	13.1	3,959	438.5	8.1	6,359	734.0	10.8
				618	365.7	14.6	572	902.1	21.0	637	730.0	40.8	680	797.0	17.5
Punjab . .	8,231	605.1	10.7	8,160	625.0	14.4	8,359	974.0	18.0	9,051	828.0	15.4	9,568	722.0	17.4
	8,601	708.8	12.5	8,622	872.7	16.1	8,685	1,032.1	16.1	7,865	1,142.5	12.8	8,519	902.0	9.9
U. P. . .	12,086	339.4	5.6	12,351	235.4	6.3	11,789	241.3	4.3	12,189	300.0	8.4	13,115	355.6	8.0
	14,865	473.5	10.0	15,652	437.1	9.4	16,417	561.9	8.2	14,240	674.0	13.0	17,398	674.0	10.2
B. & O. . .	4,214	238.1	9.3	4,209	312.2	16.6	4,784	246.2	20.3	4,876	337.2	23.8	5,330	257.2	12.2
	2,506	509.2	13.8	2,370	563.8	17.1	3,222	666.3	7.7	3,932	817.8	16.2	5,753	1,068.0	13.6
Bengal . .	6,270	590.1	13.2	6,412	602.2	11.7	7,111	895.5	9.1	6,801	871.9	10.9	7,599	1,017.0	11.9
	4,537	1,179.9	17.1	4,691	1,005.4	14.2	9,051	957.6	10.6	5,449	1,068.6	16.2	5,968	1,221.3	14.2
G. P. . .	1,921	101.0	6.2	1,834	151.0	10.9	2,111	421.1	9.0	2,058	179.8	13.1	2,314	265.1	6.3
	3,004	317.9	13.0	1,938	285.8	17.8	2,205	417.9	9.1	1,982	698.7	22.0	2,539	425.0	7.9
Bombay . .	5,765	602.1	8.5	5,766	618.5	10.4	7,776	733.9	8.9	6,546	590.4	7.9	8,765	513.7	5.9
	4,757	715.1	9.0	4,880	737.7	11.7	6,686	603.6	10.0	5,143	500.2	15.6	6,725	534.5	9.1
Madras . .	11,428	135.4	12.0	10,203	250.8	11.8	10,427	605.2	13.1	9,372	372.5	9.8	10,018	273.1	7.5
	2,730	404.8	11.4	2,823	433.7	7.8	3,343	902.1	21.0	11,669	395.5	10.4	2,306	447.0	10.8
Assam . .	1,973	634.6	30.9	1,992	554.3	19.1	2,370	539.8	10.4	2,406	629.7	22.2	3,140	506.2	21.3
Burma . .	13,293	629.9	36.7	11,513	639.3	39.3	10,432	555.3	21.0	11,124	396.6	12.5	14,151	389.9	10.7
	5,549	376.6	19.2	6,393	399.0	21.6	7,506	374.9	16.1	5,375	242.9	11.6	6,483	261.7	15.0

C.—Central Jails.  
D.—District Jails.A.—Admission rates.  
D.—Death rates.



TABLE C.—CAUSES OF ADMISSION.\*

Diseases.	Years.	January	February	March	April	May	June	July	August	September	October	November	December	Total.
Cholera.	1898	..	1	6	3	1	1	1	5	..	..	1	..	19
	1899	..	..	2	2	1	1	1	10	..	4	..	..	28
	1900	..	..	2	..	1	1	..	0	2	1	..	..	14
	1898-1902	1	..	2	2	1	2	7	7	1	1	2	..	26
1928-32	1	1	1	11	9	12	6	10	29	8	7	4	..	82
Enteric Fever.	1898	18	14	12	24	22	16	21	33	20	26	17	28	260
	1899	20	12	21	26	21	29	30	34	27	19	23	10	296
	1900	12	12	12	22	33	30	40	42	42	51	32	14	355
	1898-1902	14	19	27	24	22	22	32	34	21	22	25	13	482
1928-32	6	14	14	32	33	55	22	42	59	79	62	32	17	1,606
Malaria.	1898	62	75	114	139	163	118	165	202	202	108	126	82	1,606
	1899	1,128	998	946	951	1,046	1,223	1,496	1,524	1,704	1,978	1,947	1,816	16,247
	1900	1,128	677	825	1,000	1,160	1,042	1,180	1,707	2,597	3,593	3,289	1,775	19,788
	1898-1902	1,128	752	909	1,081	1,180	1,068	2,167	3,284	4,001	4,179	3,428	2,186	25,804
1928-32	1,465	1,197	1,638	1,103	1,103	1,278	1,701	2,275	2,275	2,857	4,366	3,456	2,279	23,424
1928-32	6,159	4,871	5,690	5,637	6,417	6,043	8,770	11,312	13,011	17,025	14,950	9,831	110,431	24,260
Pyrexia of Uncertain Origin.	1898	41	38	39	65	42	48	98	83	78	59	39	23	653
	1899	45	36	70	49	58	126	183	144	126	108	119	71	1,135
	1900	66	55	87	116	101	142	330	279	205	241	210	106	1,868
	1898-1902	139	80	107	118	148	269	140	139	127	174	119	72	2,161
1928-32	484	521	523	523	592	787	970	970	879	757	752	601	408	7,546
Dysentery.	1898	187	166	203	202	250	282	400	393	343	303	239	244	3,281
	1899	240	174	153	283	339	356	595	684	606	393	319	291	4,393
	1900	199	182	222	312	323	361	668	1,052	917	788	614	516	6,194
	1898-1902	833	839	512	657	632	514	810	909	881	574	530	372	7,013
1928-32	1,438	1,195	1,487	1,317	1,601	1,905	3,109	3,825	3,825	3,283	2,656	2,174	1,853	26,783
Diarrhoea.	1898	87	118	213	190	240	190	256	270	175	150	111	92	2,101
	1899	108	98	206	217	220	171	317	386	210	182	159	161	2,436
	1900	104	105	225	208	190	245	349	380	313	265	234	236	2,861
	1898-1902	201	259	344	351	292	339	424	433	331	243	224	146	3,687
1928-32	704	741	1,243	1,188	1,180	1,920	1,669	1,819	1,271	1,041	916	817	13,759	13,759

## AND MORTALITY.

## BY GROUPS.

Enteric Fever.		Malaria.		P. U. O.		Pneu- monia.		Dysen- tery.		Diarr- hoea.		All Causes.	
A	D	A	D	A	D	A	D	A	D	A	D	A	D
2-8	0-3	155-3	0-5	13-8	0-1	12-8	2-6	44-9	0-7	23-0	0-2	603-4	10-7
2-0	0-3	179-3	0-5	11-6	0-1	12-1	2-8	43-4	1-0	20-2	0-2	616-7	12-9
2-0	0-3	179-0	0-7	12-7	..	11-7	2-6	37-5	1-6	23-0	0-3	619-7	14-1
1-5	0-4	242-8	5-1	..	..	8-0	3-0	9-0	1-2	5-3	0-3	520-7	23-2
0-1	0-1	438-4	7-3	..	..	6-2	2-4	11-3	4-3	18-9	0-4	825-4	34-8
0-4	0-1	319-7	4-5	0-2	..	7-3	3-0	34-3	4-7	15-2	0-1	713-3	25-7
2-8	0-3	159-3	0-7	13-2	..	12-6	2-6	48-3	0-7	22-2	0-2	599-7	11-2
1-9	0-3	190-0	0-9	11-0	0-1	11-8	2-8	41-7	1-2	19-8	0-2	627-6	14-0
1-8	0-3	187-5	0-9	11-9	..	11-5	2-6	37-3	1-8	22-5	0-3	625-3	14-8
2-4	0-4	16-1	0-4	13-0	0-1	4-4	1-4	17-2	1-3	1-3	..	311-1	10-3
3-0	0-3	43-2	0-3	16-7	0-1	4-8	1-4	27-7	1-3	4-5	0-1	438-0	12-7
4-1	0-6	42-1	0-2	31-0	..	4-5	1-4	38-0	2-7	6-2	0-2	702-7	16-6
2-4	0-5	33-8	0-7	12-1	..	63-4	1-7	20-0	0-7	3-1	0-1	322-6	12-5
1-9	0-2	35-8	..	9-0	..	11-6	2-5	16-1	0-8	2-8	..	318-4	13-5
2-2	0-6	44-2	0-9	14-0	..	7-2	1-8	30-4	3-1	5-9	0-4	443-9	19-2
1-4	0-3	160-1	0-6	3-5	0-6	10-0	4-1	114-6	4-1	27-9	0-3	584-4	19-2
0-3	..	106-0	0-3	9-0	..	12-4	3-4	145-1	4-7	27-3	0-3	650-7	20-2
1-0	0-3	114-9	1-0	24-9	..	14-8	3-9	101-2	3-7	41-2	0-5	696-9	22-6
2-5	0-2	273-4	1-0	28-9	..	12-4	3-0	59-1	0-8	59-1	0-2	1,077-1	13-8
2-7	0-3	242-2	0-9	35-2	0-1	12-6	2-4	69-7	1-9	55-5	0-2	978-4	13-4
1-9	0-4	265-8	1-3	33-3	..	10-4	2-1	65-6	1-9	68-9	0-3	955-3	17-5
3-2	0-4	145-8	0-5	14-0	0-1	13-8	2-3	61-8	0-7	27-5	0-2	593-9	10-7
1-0	0-2	167-6	0-3	7-8	..	13-9	3-5	36-4	0-9	19-6	0-2	554-6	14-1
0-3	0-2	151-8	0-4	3-6	..	11-9	2-5	31-5	1-0	26-3	0-3	496-9	11-7
2-0	0-2	257-5	0-2	19-3	..	15-2	4-3	28-5	0-4	17-7	0-2	766-0	10-2
1-8	0-4	363-5	1-0	11-7	0-1	13-6	3-6	36-3	0-3	22-3	0-5	838-1	11-7
1-0	0-2	345-9	1-1	6-1	..	16-9	3-8	18-5	0-5	18-3	0-4	773-3	11-4
3-7	0-3	244-4	0-6	8-2	..	23-1	4-8	30-8	0-2	16-9	0-3	691-5	12-3
3-6	0-5	248-2	0-7	1-3	0-1	20-4	4-0	25-8	0-3	19-3	0-1	651-2	13-5
3-4	0-4	312-5	1-1	15-8	0-1	22-1	3-9	18-1	0-4	19-4	0-4	784-5	16-5
3-4	0-3	106-4	0-3	2-5	..	13-0	3-2	27-4	0-9	13-5	0-3	411-0	10-2
2-1	0-2	146-1	0-2	0-6	..	12-0	2-4	33-6	0-9	18-2	..	441-8	7-3
1-0	0-2	160-3	0-4	0-6	..	10-4	2-4	17-4	0-7	17-9	0-4	449-6	9-3
3-4	0-3	101-1	0-6	15-0	..	5-9	0-6	57-6	0-5	37-4	0-1	344-4	8-3
1-2	..	111-4	0-5	13-1	0-1	7-9	2-2	49-2	1-5	21-1	0-5	451-2	11-9
0-9	0-2	117-8	0-3	11-5	..	6-9	1-7	51-5	0-9	24-6	0-4	464-6	10-6
3-3	..	92-2	..	..	..	5-3	1-3	89-3	1-2	29-3	..	492-3	7-2
2-1	..	143-5	..	1-3	..	5-1	1-7	75-6	1-7	20-8	..	503-2	11-0
2-7	0-4	181-2	0-3	0-7	..	6-8	2-2	58-9	2-6	32-2	0-4	563-8	15-6
11-1	0-1	13-6	..	3-5	..	4-1	1-4	39-4	0-3	1-7	0-1	306-1	7-9
2-3	0-3	30-4	0-1	5-5	0-1	4-8	1-3	60-7	0-7	1-7	0-2	400-2	9-6
2-4	0-3	28-4	0-4	2-0	..	7-0	1-3	51-6	3-7	1-6	0-1	308-0	16-5
1-7	..	226-4	..	24-0	..	11-6	..	37-3	..	10-7	0-8	589-6	13-3
..	..	116-7	..	17-9	..	30-9	8-5	35-4	..	12-4	0-9	608-3	35-4
2-8	0-6	187-5	0-7	51-1	0-2	26-1	3-7	41-6	0-8	39-9	0-7	759-4	18-6

group are those for (1) 1932, (2) 1931, (3) 1932-31.  
per mille of average population.

TABLE B.—SICKNESS

Groups.*	Average strength.	Cons. tantly sick.	Influenza.		Cholera		Small-pox.
					A	D	
India excluding Andaman . . . . .	156,152 138,063 125,730	23 24 24	35.4 56.9 26.6	0.2 0.3 0.3	0.2 .. 0.2	.. 0.1 ..	0.6 0.2 0.4
Andamans . . . . .	7,605 8,100	27 48 35	2.7 2.4 3.2	.. .. 0.1	.. .. ..	.. .. ..	0.1
India including Andamans . . . . .	163,575 145,668 133,830	23 25 24	34.0 54.0 24.4	0.2 0.3 0.3	0.2 .. 0.2	.. 0.1 0.1	0.5 0.2 0.4
Group I.—Burma Coast and Bay Islands . . . . .	14,339 13,628 12,579	12 18 19	27.5 32.5 31.1	0.1 0.1 ..	.. .. 0.1	.. .. 0.1	0.4 0.1 0.1
Group II.—Burma Inland . . . . .	7,095 6,444 5,865	9 10 17	11.2 19.1 7.4	0.3 .. ..	.. .. 0.3	.. .. 0.5	1.0 .. 0.4
Group III.—Assam . . . . .	3,218 2,218	34 36	46.3 32.0 56.3	0.3 .. 0.4	.. .. 0.2	.. .. 0.1	0.3 .. 0.2
Group IV.—Bengal and Orissa . . . . .	17,279 16,232 13,441	37 36 36	106.2 114.3 52.5	0.4 0.2 0.3	0.3 0.1 0.4	0.1 .. 0.2	0.9 0.2 0.4
Group V.—Gangetic Plain and Chota Nagpur . . . . .	35,318 29,980 25,614	27 26 23	27.9 61.2 28.4	0.2 0.6 0.4	0.3 0.1 0.1	0.1 .. 0.1	1.1 0.6 0.8
Group VI.—Upper Sub-Himalaya . . . . .	19,455 18,416	21 20 23	16.6 41.5 15.6	0.1 0.4 0.2	0.4 .. 0.3	0.1 .. 0.2	0.4 0.1 0.4
Group VII.—N. W. F., Indus Valley, and N. W. Rajputana. . . . .	21,338 17,407 14,911	24 31 32	10.3 33.5 21.7	0.2 0.6 0.2	.. .. ..	.. .. ..	0.1 0.1 0.2
Group VIII.—S. W. Rajputana, C. I. and Gujarat. . . . .	5,864 5,380 5,040	11 11 15	76.4 21.8 18.9	0.2 .. 0.1	0.3 .. 0.1	.. .. ..	.. .. 0.2
Group IX.—Deccan . . . . .	13,841 10,923 9,080	16 15 17	13.0 29.7 17.3	0.1 0.3 0.1	.. 0.1 0.2	.. 0.1 0.1	0.3 0.1 0.2
Group X.—Western Coast . . . . .	3,035 2,355 2,777	18 18 20	26.3 21.2 26.5	.. 0.4 1.2	.. 0.1 0.1	.. .. ..	0.3 .. 0.1
Group XI.—Southern India . . . . .	12,233 11,890 14,865	19 25 18	59.3 54.1 25.7	0.3 0.2 0.6	.. .. 0.4	.. .. 0.2	0.2 0.2 0.3
Group XII.—Hills . . . . .	11,206 11,181 536	34 42 34	52.2 81.3 132.0	.. 0.9 0.5	.. .. ..	.. .. ..	.. .. 0.5

\* Excluding subsidiary jails.

A = Admissions.

D = Deaths.

NOTE.—The three figures opposite each administrative  
The rates have been calculated

## AND MORTALITY.

## ADMINISTRATIONS.

Tubercle of the lungs.		Pneu- monia.		Respira- tory diseases.		Dysen- tery.		Diarr- hoea.		Anaemia and De- bility.		All causes.	
A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.
5.9	1.7	12.8	2.6	32.6	0.4	44.9	0.7	23.0	0.2	3.3	0.2	603.4	10.7
6.5	2.0	12.1	2.8	30.5	0.4	43.4	1.0	20.2	0.2	9.6	0.4	618.7	12.9
7.9	2.5	11.7	2.6	27.4	0.5	37.5	1.6	23.0	0.3	7.4	0.3	619.7	14.1
2.3	1.3	8.0	3.0	15.1	0.7	9.0	1.2	5.3	0.3	9.5	3.2	520.7	23.2
3.0	2.5	6.2	2.4	20.9	0.1	11.3	4.3	13.9	0.4	9.1	3.7	325.4	34.8
3.9	1.8	7.3	3.0	30.0	0.6	34.3	4.7	15.2	0.1	6.3	1.2	713.3	26.7
5.7	0.6	12.6	2.6	31.9	0.4	43.3	0.7	22.2	0.2	8.3	0.4	599.7	11.2
6.3	2.0	11.8	2.8	30.0	0.4	41.8	1.2	19.8	0.2	9.5	0.6	627.6	14.0
7.7	2.5	11.5	2.6	27.6	0.5	37.3	1.8	22.5	0.3	7.3	0.4	625.3	14.8
5.3	2.0	44.3	6.3	94.4	0.1	14.9	0.1	7.5	..	7.0	..	729.7	11.7
10.3	4.3	25.3	3.4	42.5	0.4	11.7	0.2	10.4	..	4.0	..	473.1	12.1
12.6	3.6	21.5	5.7	44.8	0.9	19.5	0.6	17.2	0.2	4.7	0.2	758.0	17.9
4.8	2.1	14.3	4.3	47.8	0.4	34.1	0.3	21.0	0.5	13.0	0.2	801.9	13.2
3.7	2.7	11.7	3.8	51.8	0.5	31.2	0.2	27.4	0.3	16.0	0.2	940.0	13.7
5.1	2.6	15.0	3.5	43.2	0.6	12.5	0.3	22.2	0.6	13.6	0.3	878.4	14.2
7.4	1.3	13.2	2.7	27.8	0.4	21.7	0.6	15.6	0.2	7.0	0.2	538.9	9.2
7.1	1.2	12.8	3.2	21.6	0.4	31.4	0.6	10.0	0.2	5.6	0.1	542.6	11.0
3.7	1.6	13.3	2.9	25.6	0.6	30.5	0.3	12.7	0.3	3.2	0.2	435.7	10.5
7.6	2.7	16.2	2.5	38.9	0.3	143.4	1.2	54.9	0.2	1.3	..	674.5	12.7
8.0	3.5	16.1	2.9	48.8	0.8	52.3	2.2	39.6	0.2	1.2	..	577.9	19.1
7.7	2.8	10.4	2.1	32.2	0.4	67.6	2.0	38.6	0.4	3.3	0.2	530.4	15.0
5.6	1.5	12.0	2.0	36.0	1.0	59.2	0.9	58.4	0.2	17.6	0.2	1,101.1	13.0
4.3	1.5	12.6	2.3	28.9	0.1	70.0	1.7	56.2	0.3	21.5	0.8	971.1	12.8
7.7	3.2	10.3	2.1	31.6	0.4	63.6	1.9	69.7	0.4	14.8	0.4	1,007.3	14.6
9.2	1.0	7.2	1.0	20.1	0.8	46.4	1.0	23.5	0.2	3.0	0.2	344.4	8.3
7.8	1.0	12.2	3.5	16.5	1.4	52.4	2.7	3.2	0.3	4.0	1.0	343.4	17.3
7.0	2.1	9.0	2.2	15.5	0.0	52.6	1.6	13.2	0.4	5.6	0.2	256.9	13.0
2.7	0.7	13.9	1.9	28.8	0.4	59.4	0.2	33.8	0.1	7.8	0.1	536.3	7.1
2.8	1.2	17.2	3.3	39.9	0.2	48.4	0.4	27.0	0.2	6.4	0.5	560.7	10.8
3.9	1.5	18.2	3.2	39.8	0.4	43.1	0.4	31.2	0.4	4.6	0.2	653.0	10.6
6.6	1.4	4.1	..	16.5	0.2	44.7	0.5	1.6	0.1	7.6	0.3	306.4	8.1
13.5	1.4	5.1	1.4	22.0	0.5	61.1	0.9	1.6	0.2	13.8	0.2	398.5	10.1
10.9	3.1	6.9	1.3	16.0	0.4	50.3	3.8	1.5	0.1	4.3	0.4	305.3	17.0
8.9	3.4	10.5	3.9	28.5	..	111.6	3.9	28.1	0.3	12.3	1.0	602.3	18.7
7.2	3.9	12.0	3.3	61.9	0.6	140.5	4.5	27.6	0.3	12.0	1.8	653.4	19.6
11.7	5.1	14.5	3.8	43.3	0.7	99.4	3.6	43.1	0.6	9.7	0.7	704.1	22.6
4.6	2.3	5.0	1.5	9.2	0.4	18.1	1.1	1.9	..	4.2	0.5	315.4	11.0
4.0	2.2	6.7	1.7	9.0	0.0	24.0	1.1	3.8	0.1	5.3	0.9	396.2	13.0
3.8	3.7	5.4	1.5	13.6	0.3	36.2	2.8	6.1	0.3	6.5	0.5	620.4	17.1

group are those for (1) 19;  
per mille of average populi

1, (3) 1922-31.



TABLE A.—SICKNESS

STATISTICS BY

Administration.*	Average popula- tion.	Const- antly sick.	Cholera.		Small- pox.		Malaria.	
			A	D	A	D	A	D
India excluding Andamans	156,152	23	0.2	..	0.6	..	155.3	0.5
	138,003	24	..	..	0.2	..	176.3	0.5
	126,730	24	0.2	0.1	0.4	..	179.0	0.7
Andamans	7,423	27	..	..	..	..	242.8	5.1
	7,005	48	..	..	..	..	438.4	7.8
	8,100	35	..	..	0.1	..	319.7	4.5
India including Andamans	163,575	23	0.2	..	0.5	..	159.3	0.7
	145,668	35	..	..	0.2	..	190.0	0.9
	133,830	24	0.2	0.1	0.4	..	187.5	0.9
N. W. F. P.	7,964	32	..	..	..	..	269.8	0.4
	5,280	29	..	..	..	..	129.0	0.4
	3,984	31	..	..	0.1	..	353.4	1.1
Punjab	21,012	22	0.3	0.1	0.2	..	270.3	0.5
	19,845	31	..	..	0.1	..	394.6	1.2
	18,273	31	0.2	0.1	0.2	..	387.1	1.4
U. P.	36,703	21	0.2	..	0.8	..	142.6	0.4
	32,145	20	0.1	..	0.3	..	193.7	0.5
	30,105	20	0.1	0.1	0.3	..	165.7	0.4
B. and O.	12,012	33	0.5	0.2	1.3	0.1	142.7	0.5
	9,674	34	..	..	0.9	0.1	119.3	..
	6,797	28	0.3	0.1	1.0	0.1	126.6	0.4
Bengal	16,331	38	0.3	0.1	0.9	0.1	277.0	1.0
	15,438	36	0.1	..	0.3	0.1	230.0	1.0
	12,938	36	0.4	0.2	0.3	0.1	208.2	1.3
C. P.	4,980	11	..	..	0.4	..	59.4	1.2
	4,849	18	0.2	0.2	0.2	..	55.7	0.8
	4,053	12	0.2	0.1	0.2	..	43.1	0.3
Bombay	16,428	19	..	..	0.1	..	149.7	0.2
	12,822	18	..	..	0.1	..	175.0	0.2
	11,319	22	0.1	..	0.3	..	224.3	0.9
Madras	13,257	18	..	..	0.2	..	13.3	..
	12,628	24	..	..	0.2	..	29.1	0.1
	16,013	18	0.4	0.2	0.3	..	26.7	0.3
..	3,809	28	..	..	..	..	167.5	0.5
	3,330	33	..	..	0.3	..	107.5	0.3
	2,309	35	0.2	0.1	0.2	..	116.2	1.0
Burma	21,434	11	..	..	0.6	0.1	28.0	0.5
	20,072	15	..	..	0.1	..	40.8	0.5
	18,444	18	0.3	0.2	0.2	..	42.8	0.5

\* Excluding subsidiary jails.

A = Admissions.

D = Deaths.

NOTE.—The three figures opposite each administrative  
The rates have been calculated

Appendix VI  
relating to  
Section X. (Jails.)

---



*Findlay, H. T.*

The Meinicke Micro-Reaction as a Control of the Wassermann Test. (Journal of the Royal Army Medical Corps, Volume LIX, No. 1).

*Hood, A.*

Dysentery. (Journal of the Royal Army Medical Corps, Volume LVIII, No. 5).

*Jervis, O. D.*

Results of Treatment of Malaria by (a) Plasmoquine and Quinine, and (b) Atebrin, Together with Some Observations on Malaria Convalescents. (Journal of the Royal Army Medical Corps, Volume LIX, Nos. 3 and 4).

*Mansell, R. A.*

Inoculations Against Influenza. (Journal of the Royal Army Medical Corps, Volume LIX, No. 4).

*Mulligan, H. W.*

Mosquitoes and Malaria. (Allahabad Farmer, Volume VI, No. 1).

*Ramsay, G. C., and Savage, J. de la M.*

The Principles and Methods of Malaria Control in Assam. (British Medical Journal, Volume II, page 790).

*Row, R., Dal, N. P., and Gollerkeri, G. V.*

On the Value of Atebrin in Monkey Malaria. (Transactions of the Royal Society of Tropical Medicine and Hygiene, Volume XXVI, No. 5, March 1933, page 469).

*Sinton, J. A.*

Discussion on a paper entitled "Transmission of Leishmania infections", by C. M. Wenyon (Transactions of the Royal Society of Tropical Medicine and Hygiene, Volume XXV, No. 5).

*Smith, S.*

Functional Nervous Diseases in the Army. (Journal of the Royal Army Medical Corps, Volume LIX, Nos. 2 and 3).

*Stevenson, A. L.*

The Control of Influenza in a Community: A Criticism and Review. (Journal of the Royal Army Medical Corps, Volume LVIII, No. 2).

*Thomson, T. O.*

Disinfection. (Journal of the Royal Army Medical Corps, Volume LVIII, No. 6).

*Walker, W.*

Investigations into Cases of Cerebrospinal Fever in the Northern Command of the Army during 1931, Concluding with a Plea for the Early Diagnosis of the Disease. (Journal of the Royal Army Medical Corps, Volume LIX, No. 6).

*Wilson, D. C.*

Additional Factors in the Treatment of Late Rickets and Osteomalacia. (The Lancet, Volume I, page 1142).

*Stewart, A. D.*

The "Negative Phase" in Prophylaxis by Inoculation of Vaccines. (Volume LXVII, page 515).

*Strickland, C., and Roy, D. N.*

The Behaviour of Plasmodia in the Mosquito After Treatment of the Human Host with Atebrin. (Volume LXVII, page 191).

*Variava, D. D.*

Avertin Anaesthesia, A Study of 114 Cases. (Volume LXVII, page 548).

*Vere Hodge, E. H.*

Rheumatism in India. (Volume LXVII, page 241).

*Vyas, B. N., and Bhatia, B. B.*

On the Failure of *Toddalia Aculeata* in the Treatment of Malaria. (Volume LXVII, page 192).

*Wals, R. C., and Jafar, M.*

Dysentery in Burma (Military Stations) with a Note on Some Post-Dysenteric Infections. (Volume LXVII, page 446).

*Webster, W. J.*

Notes on the Study of Plague in the Field. (Volume LXVII, page 693).

*Wilson, D. C.*

A Preliminary Note on the Anti-Rachitic Value of Sun-Irradiated Yeast. (Volume LXVII, page 320).

## C.—PAPERS PUBLISHED IN OTHER JOURNALS DURING 1932.

*Biggam, J.*

Three Cases of "Tropical Typhus" occurring in Bangalore, India. (Journal of the Royal Army Medical Corps, Volume LIX, No. 2).

*Boyd, J. E. M.*

Malaria in India. Part I. (Journal of the Royal Army Medical Corps, Volume LVIII, No. 2).

Malaria in India. Part II. Anti-Malaria Work and a few Suggestions. (Journal of the Royal Army Medical Corps, Volume LVIII, Nos. 3 and 4).

*Boyd, J. S. K.*

Further Investigations into the Characters and Classification of the Mannite-Fermenting Dysentery Bacilli. (Journal of the Royal Army Medical Corps, Volume LIX, Nos. 4 and 5).

*Brahmachari, U. N.*

Studies in Kala-Azar and Chemotherapy of Antimony. Part VI. Treatment of Kala-Azar with Intramuscular Injection of Sodium Sulphomethyl Stibanilate. (Transactions of the Royal Society of Tropical Medicine and Hygiene, Volume XXVI, No. 4, January 1933, page 389).

*Burke, G. T., and Stott, H.*

A Case of Syphilis (Gummata) of the Heart. (British Medical Journal, Volume II, page 789).

*Covell, G.*

Malaria in Calcutta. (Bengal Secretariat Book Depot, Calcutta).

*Napier, L. E., Krishnan, K. V., and Lal, C.*

Cytological Studies of the Blood and Tissues in Kala-Azar and Associated Conditions. Part I. Supra-Vital Staining Technique. (Volume LXVII, page 251).

Cytological Studies of the Blood and Tissues in Kala-Azar and Associated Conditions. Part III. Large Mononuclear Cells in Human Malaria. (Volume LXVII, page 135).

*Pandit, C. G., and Rao, R. S.*

An Epidemic of Jaundice in the Alipuram Jail, Bellary (South India). (Volume LXVII, page 77).

*Pasricha, C. L., de Monte, A. J., and S. K.*

Mutation of Cholera Vibrios (The Characters of the Population of a Freshly-Isolated Cholera Colony, with a Note on Some Colony Variants of Cholera and Cholera-like Vibrios). (Volume LXVII, page 64).

A Preliminary Note on New Types of Cholera 'Phage—Types D and E. (Volume LXVII, page 262.)

Cholera and Cholera-like Vibriophages. (Volume LXVII, page 487).

*Rao, G. R., and Roy, A. T.*

"Mercurochrome-220 Soluble" in Leprosy Work. (Volume LXVII, page 124).

*Ray, N. K.*

A National Drink of the Hill-Folk of Darjeeling. (Volume LXVII, page 551).

*Robinson, J. F., and Seshachalam, T.*

Spinal Anæsthesia. (Volume LXVII, page 148).

*Rogers, L.*

Result of the Forecast of Cholera, Small-pox and Plague in India in 1931 and Forecast for 1932. (Volume LXVII, page 61).

*Roy, A.*

Relapse of Active Signs in "Burnt-Out" Cases of Leprosy. (Volume LXVII, page 12).

*Sabawala, B. P.*

Notes on Urinary Calculi. (Volume LXVII, page 509).

*Sahu, D. R. N., and Bose, A. N.*

The Calcium Content of the Common Diets in India. (Volume LXVII, page 140).

*Sarathy, M. K. P.*

Observations on Malaria in Puri District, Orissa. (Volume LXVII, page 254).

*Seal, S. C.*

Primary Bronchogenic Carcinoma. (Volume LXVII, page 552).

*Sur, S. N., Sarkar, H. P., and Banerji, K. M.*

Plasmochin as a Malarial Gametocide. (Volume LXVII, page 490).

*Senior-White, R.*

Notes on a Brief Tour in Malaya. (Volume LXVII, page 683).

*Shrikhande, Y. G.*

Koch's Discovery of the Tubercle Bacillus—Its Importance and Significance. (Volume LXVII, page 691).

*Singh, B. H.*

Milk Injections in Malarial Spleens. (Volume LXVII, page 498).

*Soman, D. W.*

A Routine Combined Method of "Widal Reaction and Clot Culture" for the Diagnosis of Enteric Infections. (Volume LXVII, page 15).

*Krishnan, K. V., Lal, C., and Napier, L. E.*

Cytological Studies of blood and tissues in Kala-Azar and Associated Condition. Part II. Morphology of Leucocytes in supra-vital Preparations. (Volume LXVII, page 130).

*Knowles, R., and Das Gupta, B. M.*

A Study of Monkey-Malaria, and its Experimental Transmission to Man. A Preliminary Report. (Volume LXVII, page 301).

Clinical Studies in Malaria by Cultural and Enumerative Methods—Second Series. (Volume LXVII, page 432).

*Lloyd, R. B.*

The Interpretation of Wassermann Results in India. (Twelve years' Experience in Calcutta.) (Volume LXVII, page 1).

*Lowe, John.*

Leprosy in India. The Present Outlook. (Volume LXVII, page 208).

*Malhotra, R. C.*

The Best Source to Iodine, (Organic *vs.* Inorganic) as related to Thyroid Disturbances. (Volume LXVII, page 337).

*Mallya, B. G., and Maity, B. B.*

The Curative Value of a Locally-prepared Sample of Sulphar-Senobenzene-Thiosarmines, Part II. (Volume LXVII, page 249).

*Maplestone, P. A.*

The Testing of Anthelmintics. (Volume LXVII, page 673).

*Maplestone, P. A., and Mukerji, A. K.*

Hexylresorcinol as an Anthelmintic. (Volume LXVII, page 610).

*McCay, F. H.*

The Treatment of Bacillary Dysentery by Bacteriophage. (Volume LXVII, page 666).

*Mitra, P. N.*

Isohæmagglutination. (Volume LXVII, page 139).

*Moorthy, V. N.*

An Epidemiological and Experimental Study of Dracontiasis in Chitaldrug District. (Volume LXVII, page 498).

Treatment and Prophylaxis of Dracontiasis. (Volume LXVII, page 617).

*Mudaliar, A. L., and Menon, C. K.*

A New Conception in the Treatment of Puerperal Sepsis. An Interim Report on the Value of Vitamin A in the Treatment of Puerperal Sepsis. (Volume LXVII, page 606).

*Muir, E.*

The Intradermal Method of Injecting Hydnocarpus Preparations in Leprosy. (Volume LXVII, page 121).

*Napier, L. E., Butcher, D., and Das Gupta, C. R.*

Field Experiments with Atebrin and Plasmochin. (Volume LXVII, page 186).

*Napier, L. E., and Campbell, H. G. M.*

Observations on a Plasmodium Infection which causes Hæmoglobinuria in Certain Species of Monkey. (Volume LXVII, page 246).

*Napier, L. E., and Das Gupta, B. M.*

Atebrin: A Synthetic Drug for the Treatment of Malaria. (Volume LXVII, page 181).

*Dhunjibhoy, J. E.*

Sulphur Treatment in Mental Diseases. An Experimental Study of 100 cases. (Volume LXVII, page 612).

*Dikshit, B. B.*

Alepol in Leprosy. (Volume XVII, page 7).

*Dikshit, B. B., and Rao, D. H.*

Percain in Spinal Anaesthesia. Volume LXVII, page 69).

*Dutta, P. C.*

A Contribution to the Surgery of Fascial Transplantation. (Volume LXVII, page 326).

*Fitzgerald, G. H.*

An Outbreak of Exfoliative Glossitis in an Assam Jail. (Volume LXVII, page 556).

*Gill, C. A.*

The Determination of Sex. (Volume LXVII, page 269).

*Greval, S. D. S.*

Rabies in the Mongoose. Reports from Records including a Report on the First Positive Brain of Mongoose examined at Kasauli. Comments including Speculation and Bearing on Treatment. (Volume LXVII, page 451).

The Role of Serology in Rabies. (Volume LXVII, page 676).

*Green-Armytage, V. B.*

Gynaecology in the Tropics. (Volume LXVII, page 22).

Obstetrics in the Tropics. (Volume LXVII, page 144).

Implantation of the Ureters for Inoperable Visico-Vaginal Fistula and Ectopia Vesicae, A New Technique. (Volume LXVII, page 631).

*Gupta, N.*

The Anaemia of Pregnancy. (Volume LXVII, page 421).

*Hance, J. B., Trivedi, T. H., and Chhaya, H. M.*

A short account of a Recent Out-break of Diphtheria at Rajkot, with Special Reference to the Carrier Problem. (Volume LXVII, page 552).

*Ince, H. T.*

An Epidemic of Jaundice in Alipuram Jail, Bellary, from January to July 1931. (Volume LXVII, page 13).

Acriflavine as a Counter-stain in the Ziehl-Neelsen Method of Staining. (Volume LXVII, page 262).

*Jafar, M.*

Malaria in Mingaladon Cantonment, Burma. (Volume LXVII, page 493).

*Jafar, M., and Bachan Singh.*

Dengue Fever in the Rangoon-Mingaladon Area. (Volume LXVII, page 674).

*Jamal-ud-din.*

Notes on Cataract in the Punjab. (Volume LXVII, page 386).

*Kirwan, E. W. O'G.*

Epidemic Dropsy Glaucoma. (Volume LXVII, page 636).

The Diagnosis and Treatment of Non-Congestive Glaucoma. (Volume LXVII, page 661).

*Krishnan, K. V.*

The Defence Mechanism of the Human Body. (Volume LXVII, page 637).



*Bhandari, A. D.*

Alepol in the Treatment of Leprosy. (Volume LXVII, page 244).

*Bhattacharjee, S. P.*

The Reticulo-Endothelial System and Some Diseases in the Tropics. (Volume LXVII, page 271).

*Bilderbeck, C. L.*

A Practical Note on the Cyanide Fumigation of Ships. (Volume LXVII, page 200).

*Bose, J. P.*

A Study of the Distribution of Sugar in the Blood of Diabetic and Non-Diabetic Indian Subjects. (Volume LXVII, page 541).

*Bose, A. N., and Ghosh, Dastidar, S. K.*

The Protective Value of T. A. B. Inoculation as indicated by the Agglutinating Power of the Serum. (Volume LXVII, page 504).

*Brahmachari, B. B.*

The Vitamine Value of the Food Fats of Bengal.—A Preliminary Study. (Volume LXVII, page 377).

Constants of Pure Buffalo Ghee. (Volume LXVII, page 623).

*Bunce, E. H.*

Observations on the Composition of Butter imported into Burma. (Volume LXVII, page 326).

*Chopra, R. N., and Chaudhury, S. G.*

The Prognostic Value of the Aldehyde Reaction in Kala-Azar. (Volume LXVII, page 260).

*Chopra, R. N., and Chopra, G. S.*

Chloral Hydrate and Paraldehyde as Drugs of Addiction. (Volume LXVII, page 481).

*Chopra, R. N., and Chowhan, J. S.*

Snake Venoms in Medicine. (Volume LXVII, page 574).

*Chopra, R. N., and De, P.*

A Preliminary Note on the Action of the Alkaloid of *Moringa Pterygosperma* (N.O, Moringae). (Volume LXVII, page 128).

*Chopra, R. N., Dikshit, B. B., and Chowhan, J. S.*

Berberine and Berberine-containing Plants in Pharmacology and Therapeutics. (Volume LXVII, page 194).

*Chopra, R. N., and Mukherji, B.*

Indian Chenopodium. (Volume LXVII, page 5).

Indian Ipecacuanha. (Volume LXVII, page 88).

Musk : Its Pharmacological Action and Therapeutic Uses. (Volume LXVII, page 321).

Thymol, Menthol and Camphor from Indian Sources. (Volume LXVII, page 361).

A Preliminary Note on the Absorption of "Makaradhwaja" (Sulphide of Mercury). (Volume LXVII, page 448).

*Das, K.*

Inversion of the Uterus. A Report of Eight Cases with Comments on Treatment. (Volume LXVII, page 609).

*Das Gupta, J.*

A Preliminary Report on *Bacillus Coli* in the Calcutta Filtered Water Supply. (Volume LXVII, page 380).

*De, J. C., Laha, K., Acharya, A. K., and Ghose, K. K.*

The Significance of the Widal Reaction and other Laboratory Findings in Typhoid Fever. (Volume LXVII, page 366).

*Covell, G.*

Malaria in Calcutta. (Volume III, No. 1).

Malaria in Patiala State. (Volume III, No. 1).

A further note on malaria in Patiala State. (Volume III, No. 2).

\* *Covell, G., and Bailly, J. D.*

Malaria in Sind. Part VIII. Malaria in Shahbandar Division, Karachi. (Volume III, No. 1).

The study of a regional epidemic of malaria in Northern Sind. (Volume III, No. 2).

*Gupta, P., Ghanasyam Das, and Majumdar, Nizamur Rahman.*

A malaria survey of Kachugaon, Goalpara District, Assam. (Volume III, No. 2).

*Kehar, N. D.*

Ultraviolet absorption spectra studies in malarial sera. (Volume III, No. 1).

*Mulligan, H. W., and Abdul Majid.*

Some experiments to determine the efficacy of wire gauze screens of different apertures in excluding Anopheline mosquitoes in India. (Volume III, No. 1).

*Rice, E. M., and Savage, J. de la M.*

Malaria Survey of two Tea Estates in Upper Assam. (Volume III, No. 2).

*Sinton, J. A.*

Helminthic infections in Indian Anopheline mosquitoes. (Volume III, No. 2).

*Sinton, J. A., and Mulligan, H. W.*

Studies in Immunity in malaria. Part I. An intradermal reaction in malarial infections in monkeys. (Volume III, No. 2).

A critical review of the literature relating to the identification of the malarial parasites recorded from monkeys of the families *Cercopithecidae* and *Colobidae*. (Volume III, No. 2).

*Strickland, C., and Murphy, R. A.*

River-sand silting and other anti-malarial measures in South Sylhet, Assam. (Volume III, No. 1).

*Water-Logging Board, Punjab.*

Principles to be observed in the preparation of canal projects and in their execution. (Volume III, No. 2).

## B.—PAPERS PUBLISHED IN THE INDIAN MEDICAL GAZETTE DURING 1932— VOLUME LXVII.

*Acton, H. W.*

The Classification and Grading of Different Qualities of Indian Rices in connection with the Epidemic Dropsy Problem. (Volume LXVII, page 640).

*Acton, H. W., Pasricha, C. L., Roy, A. C., and Das Gupta, S. M.*

A New Vegetable Culture Medium made from the Papain Digest of Mung Dal (*Phaseolus Mungo*) Green Variety. (Volume LXVII, page 619).

*Balfour, M. I., and Talpade, Shakuntala K.*

The Influence of Diet on Pregnancy and Early Infant Mortality in India. (Volume LXVII, page 601).

*Basu, U. P.*

The Prevention of Heart Affections in India. (Volume LXVII, page 566).

*Berkeley-Hill, O. A. R.*

The Place of Psychiatry in the Medical Colleges and Schools in India. (Volume LXVII, page 578).

Sinton, J. A., and Mulligan, H. W.

Note on an Intradermal Reaction in Monkey Malaria. (Volume XX, No. 2).

Sitapati Ayyar, T.

The Serological Classification of Lactose Fermenters (*B. coli*) as a Guide in determining their Source. (Volume XX, No. 2).

Stewart, A. D., and Ghosal, S. C.

On the Value of Wilson and Blair's Bismuth Sulphite Medium in the Isolation of *B. typhosus* from Faeces and Sewage. (Volume XX, No. 1).

Stott, H.

The Distribution and Cause of Endemic Goitre in the United Provinces. Part II. The Naked Eye and Microscopic Anatomy of Goitre, with Special Reference to the Endemic Goitre of the United Provinces. (Volume XX, No. 1).

The Distribution and Cause of Endemic Goitre in the United Provinces. Part III. Cause and Summary of Treatment. (Volume XX, No. 1.)

Strickland, C.

Edible and Paralytic Bugs, one of which a new Species *Cyc. pella subhimalayensis* n. sp. (*Hemipteron, Heteropteron, Pentatomida, Dinadorina*). (Volume X, No. 3).

Sundar Rao, S., and Iyengar, M. O. T.

The Escape of the Filaria Larva from the Proboscis of *Culex fatigans*. (Volume XIX, No. 3).

Experimental Infection of some Indian Mosquitoes with *Wuchereria (Filaria) bancrofti*. (Volume XX, No. 1).

Vasudevan, A.

An Unusual Type of Parasitic Infection of Forearm. (Volume XX, No. 1).

Wats, R. C., and Eyles, C. M. E.

The Relative Values of Meinicke Micro-Flocculation Test and Wassermann Reaction based on a Comparison of 1,200 Sera. (Volume XX, No. 1).

Some Source of Vitamin C in India. Part II. Germinated Pulses, Tomatoes, Mangoes and Bananas. *contd.* (Volume XX, No. 1).

Wats, R. C., and White, W. I.

The Malarial Pigment (Hamozoin) in the Spleen. (Volume XIX, No. 3).

Wills, Lucy and Bilimoria, H. S.

Studies in Pernicious Anæmia of Pregnancy. Part V. Production of a Macrocytic Anæmia in Monkeys by Deficient Feeding. (Volume XX, No. 2).

Wilson, D. C.

Osteomalacia (Late Rickets) Studies. Part X. Administration of Calcium Phosphate. (Volume XX, No. 2).

Yacob, M.

Studies of the Genus *Proteus*. Part I. A Cultural and Serological Study of certain Strains of the *Proteus* Group. Part II. The Laboratory Diagnosis of Typhus Fever. The Wilson-Weil-Felix Reaction. (Volume XIX, No. 3).

## (ii) PAPERS PUBLISHED IN THE RECORDS OF THE MALARIA SURVEY OF INDIA.

Barrand, P. J.

*Anopheles aitkeni* James var. n. *pinjarensis*. (Volume III, No. 2).

Bose, K.

Confirmation of *A. philippinensis* as a malaria carrier in Bengal. (Volume III, No. 1).

Pandit, C. G., Menon, K. P., and Mohamad Omar Sahib.

Experiments on Protection of Monkeys with Anti-Vaccinal Serum against the Viruses of Vaccinia and Variola. (Volume XIX, No. 4).

Pandit, C. G., and Sanjiva Rao, R.

On the Type of Cholera Bacteriophages of Cholera in Madras. (Volume XIX, No. 4).

A Note on the Antigenic Structure of Secondary Cultures obtained with the Three Types of Cholera 'Phages and a Strain of Cholera Vibrio. (Volume XIX, No. 4).

Pandey, G. P., and Dutt, S.

Chemical Examination of some Indian Medicinal Plants: *Tinospora cordifolia*, *Solanum xanthocarpum* and *Fumaria officinalis*. (Volume XX, No. 2).

Puri, I. M.

Studies on Indian Simuliidae. Part I. *Simulium himalayense* sp. n.; *Simulium gurneyae* Senior-White; and *Simulium nigriticum* sp. n. (Volume XIX, No. 3).

Studies on Indian Simuliidae. Part II. Descriptions of Males, Females and Pupae of *Simulium rufibasis* Brunetti, its Variety *fasciatum* nov. var. and of Three New Species from the Himalayas. (Volume XIX, No. 3).

Studies on Indian Simuliidae. Part III. Descriptions of Males, Females and Pupae of *S. griseifrons* Brunetti (1911) and of Four New Species with Striped Thorax. (Volume XIX, No. 4).

Studies on Indian Simuliidae. Part IV. Descriptions of two new Species from North-East India *Simulium howletti* sp. n. and *Simulium hirtipannus* sp. n., with a Note on *S. ornatum* Meigen. (Volume XX, No. 2).

Studies on Indian Simuliidae. Part V. Species and Varieties of the *Striatum* Series. (Volume XX, No. 2).

Radhakrishna Rao, M. V.

An Investigation into the Causation of Ascites. (Volume XX, No. 2).

Raghunatha Rao, G.

Studies on Serum Proteins in Leprosy, with Special Reference to Hydnocarpus Treatment. (Volume XIX, No. 4).

Rahman, S. A., and Abhyankar, R. N.

A Suitable Formula of Ringer's Solution for Perfusion Work on the Hearts of Indian Frogs. (Volume XX, No. 2).

Ranganathan, S.

Researches on "Stone". Part XIII. X-ray Diffraction Studies of Calculi. (Volume XIX, No. 4).

Mineral Metabolism in Rabbits fed on a Cabbage Diet. (Volume XX, No. 2).

Ray, J. C.

Cultivation of Various Leishmania Parasites on Solid Medium. (Volume XX, No. 2).

Sanjiva, Rao, R.

The Influence of H. Ion Concentration on Cholera Bacteriophage. (Volume XX, No. 2).

Short, H. E., et al.

Reports of the Kala-Azar Commission, India. Report No. II. (1926-1930). (Indian Medical Research Memoir No. 25).

Short, H. E., and Swaminath, C. S.

The Relative Susceptibility of Chinese Hamsters (*Cricetus griseus*) to Kala-Azar by the Oral and Subcutaneous Routes. (Volume XX, No. 1).

Sinton, J. A.

Notes on some Indian Species of the Genus *Phlebotomus*. Part XXX. Diagnostic Table for the Females of the Species recorded from India. (Volume XX, No. 1).

Some Further Records of *Phlebotomus* from Africa. (Volume XX, No. 2).

Notes on some Indian Species of the Genus *Phlebotomus*. Part XXXI. *Phlebotomus eadithae* n. sp. (Volume XX, No. 2).

*Maitra, G. C., and Mallick, S. M. K.*

Observations on Detoxication of Daboya Venom by Hepatic Lipoids with a Note on the Anti-Viperine Potency of Kasauli Antivenin. (Volume XX, No. 1).

*Mallick, S. M. K., and Maitra, G. C.*

On the Distribution of Protective Principle in Different Protein Fractions of Horse Serum Immunized against Snake Venom. (Volume XIX, No. 3).

*Maplestone, P. A.*

Further Observations on Seasonal Variation in Hookworm Infection. (Volume XIX, No. 4).

The Genera *Heterakis* and *Pseudaspidodera* in Indian Hosts. (Volume XX, No. 2).

*Mason, E. D.*

Standards for predicting the Normal Vital Capacity of the Lungs in South Indian Women from Height, Weight and Surface Area. (Volume XX, No. 1).

*McCarrison, R.*

Effect of Sunlight and Darkness on the Thyroid Gland. (Volume XX, No. 2).

*McCarrison, R., and Madhava, K. B.*

The Effect of Insanitary Condition on the Thyroid Gland and other Organs of the Body. (Volume XX, No. 2).

The Life Line of the Thyroid Gland. A Contribution to the Study of Goitre. (Indian Medical Research Memoir No. 23).

*Mudaliar, A. L., and Narasimha Rao, K.*

Interim Report on "Pernicious Anæmia of Pregnancy". (Volume XX, No. 2).

*Muir, E., and Chatterji, S. N.*

The Infection of Stratified Epithelium in Leprosy. (Volume XIX, No. 4).

*Muir, E., and Santra, Isaac.*

Sample Surveys of Leprosy in India. (Volume XX, No. 2).

*Murthi, K. N., and Sundara Rao, P. J.*

An Experimental Contribution to the Diagnosis of Pernicious Anæmia. (Volume XX, No. 1).

*Naidu, B. P. B., and Avari, C. R.*

Bacteriophage in the Treatment of Plague. (Volume XIX, No. 3).

*Naidu, B. P. B., and Sahe, R. G.*

"Germanin" ("Bayer 205") in the Treatment of Plague. (Volume XIX, No. 3).

The Comparative Value of Anti-Plague Bilibaccine and Haffkine's Plague Prophylactic. (Volume XIX, No. 4).

*Napier, L. E.*

The Pentavalent Compounds of Antimony in the Treatment of Kala-Azar. Part VI. A Comparison of Results with Different Compounds. (Volume XIX, No. 3).

The Pentavalent Compounds of Antimony in the Treatment of Kala-Azar. Part VII. Neostibosan: di-ethyl-amine para-amino-phenyl stibiate; 254 Cases. (Volume XIX, No. 3).

*Narayana Menon, V. K., and Narayana Rao, D.*

A New and Cheap Source of Urease. (Volume XIX, No. 4).

*Niyogi, S. P., Narayana, N., and Desai, B. G.*

Studies in the Nutritive Value of Indian Vegetable Food-Stuffs. Part III. Nutritive Values of Lentil, *Lens esculenta*, Mönch; Cow Pea—*Vigna catjang*, Walp; and Aconite Bean—*Phaseolus aconitifolius*, Jacq. (Volume XIX, No. 3).

Studies in the Nutritive Value of Indian Vegetable Food-Stuffs. Part IV. Nutritive Value of Green Gram, *Phaseolus Mungo* and Black Gram, *Phaseolus radiatus*. (Volume XIX, No. 4).

*Goyle, A. N., and Sen Gupta, P. N.*

Notes on Spontaneously Agglutinating Strains of *V. cholerae* both Natural and Artificially Produced. (Volume XX, No. 1).

*Gulati, A. N.*

Is Paragonimiasis likely to spread in India? (Volume XIX, No. 3).

*Hughes, T. A., and Malik, K. S.*

Observations on Oedematous Nephritis. (Volume XX, No. 1).

*Hughes, T. A., Shrivastava, D. L., and Malik, K. S.*

A Note on the Blood Cholesterol in Osteomalacia. (Volume XIX, No. 4).

*Iswariah, V., and David, J. C.*

The Pharmacological Action of the Venom of Russell's Viper of India (*Daboia* or *Vipera elegans*). (Volume XIX, No. 4).

*Iyengar, M. O. T.*

Anopheles Breeding in Relation to Season. (Volume XIX, No. 3).

Seasonal Incidence of Tertian, Sub-Tertian and Quartan Infections. (Volume XX, No. 1).

Filariasis in North Travancore. (Volume XX, No. 2).

*Iyengar, M. O. T., and Sarathy, M. K. P.*

A Constant Humidity Apparatus for Mosquitoes. (Volume XIX, No. 4).

*Jarvis, O. D.*

Further Researches into the Treatment of Chronic Benign Tertian Malaria with Plasmoquine and Quinine. (Volume XX, No. 2).

*Knowles, R., Das Gupta, B. N., and Basu, B. C.*

Studies in Avian Spirochaetosis. Parts I and II. (Indian Medical Research Memoir, No. 22).

*Korke, V. T.*

Observations on Filariasis in some Areas in British India. Part VIII. (Volume XX, No. 1).

*Krishnan, B. T., and Vareed, G.*

Basal Metabolism of Young College Students, Men and Women, in Madras. (Volume XIX, No. 3).

The Vital Capacity of 103 Male Medical Students in South India. (Volume XIX, No. 4).

*Kurulkar, G. M., and Rajadhyaksha, V. S.*

Anthropometric Measurements in Bombay. Part I. (Volume XX, No. 1).

*Linton, R. W.*

Studies on the Antigenic Structure of *Vibrio cholerae*. Part I. Serological Reactions of a Carbohydrate-Like Fraction. (Volume XX, No. 1).

*Lloyd, R. B.*

Protein Graphs in Syphilis with their Relation to the Wassermann Reaction. (Volume XIX, No. 4).

*Lowe, J., and Christian, E. B.*

Bacteriological Examination in Leprosy. A Study in the Efficiency of the various Methods in Common Use. (Volume XIX, No. 3).

*Maitra, G. C., and Ahuja, M. L.*

A Comparative Study of the Efficiency of Cholera Vaccine stored in a "Frigidaire" at 4°C. and in a Biological Incubator at 37°C. (Volume XIX, No. 3).

# APPENDIX TO SECTION VIII.—LABORATORIES AND MEDICAL RESEARCH.

*List of Scientific Papers by Research workers under the Government of India, the Indian Research Fund Association and Provincial Governments published during 1932.*

## A.—(i) PAPERS PUBLISHED IN THE INDIAN JOURNAL OF MEDICAL RESEARCH AND ITS MEMOIRS. (I. J. M. R.).

*Anderson, L. A. P.*

On the Standardization of Russell's Viper Antivenin. (Volume XX, No. 1).

*Barraud, P. J.*

The Early Stages of some Indian Mosquitoes: *Orthopodomyia*. (Volume XIX, No. 4).

*Basu, N. K.*

Role of Adrenaline in maintaining the normal tonus of Organs of the Body. (Volume XIX, No. 3).

*Boyd, T. C., and Ganguly, H. D.*

Lead in Urine. (Volume XX, No. 1).

*Caius, J. F. and Mhaskar, K. S.*

Notes on Indian Scorpions. (Indian Medical Research Memoir No. 24).

*Chaudhuri, H. P.*

All-India Life Tables. (Volume XX, No. 2).

*Chopra, R. N., and Chaudhury, S. G.*

On the Electric Charge of Erythrocytes. Part I. Effect of pH and Quinine Bihydrochloride. (Volume XIX, No. 4).

*Chopra, R. N., Chopra, G. S., and Grewal, K. S.*

Opium Habit in the Punjab. Part I. (Volume XX, No. 2).

*Chopra, R. N., and Chowhan, J. S.*

Action of Venom of the Indian Daboia (*Vipera russellii* vel *Vipera elegans*) on certain Protozoa. (Volume XX, No. 1).

*Chopra, R. N., De, Premankur, and De, Nripendra Nath.*

*Moringa pterygosperma* (N. O. *Moringae*). (Volume XX, No. 2).

*Chopra, R. N., Dikshit, B. B., and Chowhan, J. S.*

Pharmacological Action of Berberine. (Volume XIX, No. 4).

*Christophers, S. R., and Craighead, A. C.*

The Diffraction (Halometric) Method of determining the Average Diameter of Red Blood Corpuscles. (Volume XIX, No. 3).

*De, M. N.*

Some facts about the Incidence of Splenomegaly in Bengal. (Volume XIX, No. 4).

*Dikshit, B. B.*

Action of Narcotine on the Gastro-Intestinal Tract. (Volume XIX, No. 3).

Pharmacology of Salts of Fatty Acids of Chaulmoogra Oil. Part I. Alepol. (Volume XIX, No. 3).

*Ghosh, B.*

Comparative Study of Larval Characters of *A. ludlowii* (Theobald) and *A. subpictus* (Grassi) (Volume XIX, No. 4).

**Appendix V**  
*relating to*  
**Section VIII.**

---





TABLE B.—VACCINATIONS PERFORMED IN BRITISH AND INDIAN ARMIES DURING 1932.

## (i) OFFICERS AND OTHER RANKS.

Commands.	BRITISH TROOPS.				W. O., N. C. Os. and men.			
	Officers.							
	Number.	Per cent. success.			Number.	Per cent. success.		
			P.	R.			P.	R.
TOTAL			100	81	11,874	77	68	
Northern	84	87			5	3,945	100	71
Western	48	79	100		27	911	74	64
Eastern	61	69			1	4,008	100	
Southern	68	85			2	3,264	50	78
Burma District		78				361		78

## INDIAN TROOPS.

Commands.	European Officers.				I. C. Os., N. C. Os. and Men.				Followers.			
	Number.		Per cent. success.		Number.		Per cent. success.		Number.		Per cent. success.	
	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.
TOTAL	6	217	100		1,309	37,218	74	76	193	9,139	94	77
Northern	6	116	100	87	445	18,976	98	83	114	4,800	98	81
Western	..	39	..	92	186	3,146	91	89	40	937	84	93
Eastern				56	572	8,953	45	59	17	1,513	88	71
Southern				88	90	5,882	95	72	9	1,808	100	63
Burma District			100		16	782	100	78	4	81	100	49

## (ii) FAMILIES (BRITISH ARMY).

Commands.	Women.				Children.			
	Number.		Per cent. success.		Number.		Per cent.	
	P.	R.	P.	R.	P.	R.	P.	R.
TOTAL	30	666	100	78	723	858	81	81
Northern	6	242	100	78	228	270	94	79
Western	6	95	100	88	72	61	85	92
Eastern	2	133	100	67	189	204	63	74
Southern	6	164	100	80	204	307	81	86
Burma District	10	32	100	81	35	16	91	62

## (iii) FAMILIES (INDIAN ARMY).

Commands.	Number.				Per cent. success.				Children.			
	Number.		Per cent. success.		Number.		Per cent. success.		Number.		Per cent. success.	
	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.	P.	R.
TOTAL	4	117	100	91	49	49	96	88				
Northern	1	38	100	82	5	10	80	100				
Western	3	17	100	100	10	5	100	100				
Eastern	..	51	..	96	24	..	96	74				
Southern	..	9	..	89	10	10	100	100				
Burma District	..	2	..	50	1	..	..	100				

I. C. Os. = Indian Commissioned Officers.

TABLE A.—VACCINATION STATISTICS FOR 1932-33.

Province.	Population.	Operations performed.			Percentage of success.		Children successfully vaccinated.		Total cost, per successful case.	Average cost per 1,000 successful population.			Ratio of successful annual births per 1,000 successfully vaccinated.	
		P.	R.	Total.	P.	R.	Under 1 year.	1 to 6 years.		Rs.	Rs. A.	P.		
BRITISH INDIA . .	266,354,156	10,002,875	10,584,924	20,587,799	97.0	54.8	4,072,080	9,179,902	38,97,074	0	4	0	51.3	45.0
N.-W. F. P. . .	3,470,560	177,115	129,618	306,733	98.5	80.2	93,284	60,751	26,526	0	1	7	76.0	136.9
Punjab . . .	28,515,637	1,008,594	2,603,721	3,607,295	98.4	69.8	708,069	175,110	3,46,751	0	2	4	101.3	72.5
Delhi . . .	636,246	34,275	155,608	189,883	95.4	44.4	19,409	8,147	8,558	0	1	11	116.7	69.2
U. P. . .	48,408,768	1,446,537	277,055	1,723,642	96.6	33.5	865,588	421,729	3,75,063	0	4	2	30.0	51.8
B. & O. . .	37,677,576	1,102,485	446,201	1,548,686	99.7	60.2	281,060	715,978	1,56,120	0	1	11	34.3	22.1
Bengal . . .	50,114,002	2,622,872	4,162,351	6,885,223	89.6	43.4	291,920	6,467,560	4,57,686	0	1	9	31.2	29.5
C. P. . .	15,507,723	562,638	100,068	662,691	93.3	44.0	394,657	100,388	1,94,825	0	5	11	34.3	56.3
Bombay . . .	21,746,180	710,178	528,742	1,238,920	99.0	54.6	464,510	179,650	6,02,847	0	13	0	34.9	59.8
Madras . . .	46,204,545	1,406,717	1,352,568	2,759,275	98.6	38.7	704,956	515,047	6,76,168	0	6	2	38.7	43.3
Coorg . . .	163,327	7,252	7,428	14,680	95.8	59.9	1,103	3,908	5,737	0	8	5	66.5	25.5
Assam . . .	9,247,557	369,975	315,854	685,829	94.8	62.4	65,031	222,454	1,06,377	0	3	8	54.2	27.3
Burma . . .	13,102,048	637,649	502,593	1,140,152	95.7	33.2	168,701	312,615	4,33,527	0	9	10	53.9	50.2
Ajmer-Merwara . .	560,292	21,623	2,227	23,850	98.9	61.6	15,792	3,094	7,744	0	5	6	39.9	90.8

**Appendix IV**  
**relating to**  
**Section VI**

---



TABLE A.—MATERNAL MORTALITY PER 1,000 BIRTHS IN CERTAIN TOWNS—*contd.*

	1932.		1931.	
	Deaths.	Death rate.	Deaths.	Death rate.
<i>Madras Presidency.</i>				
Chingleput	22	30.5	27	35.5
Tanjore .	57	22.2	84	29.9
Guntur .	81	29.6	91	29.2
Nellore .	50	26.8	55	26.4
Negapatam	45	28.3	41	26.0
Nandyal .	19	21.3	22	25.3
Anantapur	18	33.0	14	23.7
Mayavaram	10	9.5	25	23.7
Kurnool .	22	13.0	37	22.7
Cuddapah	35	38.8	21	22.6
Kumbakonam	35	16.0	47	21.4
Tinnevely	30	15.7	43	21.0
Cuddalore	38	18.1	40	19.1
Trichinopoly	54	12.3	82	18.0
Conjeeveram	42	19.3	37	15.9
Calicut .	51	17.1	45	15.9
Rajahmundry	38	17.9	33	14.5
Palamcottah	30	15.8	30	14.4
Madura .		13.0	94	14.0
Vellore .	39	13.1	40	13.5
Cocanada .	22	12.6	32	12.1
Tuticorin .	26	13.1	26	11.8
Bozwada .	29	11.3	28	11.5
Ellore .	20	10.7	22	11.4
Madras .	279	10.1	299	11.2
<i>Burma.</i>				
Mandalay . . . . .	59	7.7	76	10.1
Moulmein . . . . .	20	10.8	17	10.4
Rangoon town . . . . .	50	5.6	68	7.9
Myingyan . . . . .	21	21.1	17	17.9
Akyab . . . . .	5	7.6	14	19.6
Prome . . . . .	16	15.7	13	14.0
Pegu . . . . .	18	21.2	22	26.6
<i>Cooorg.</i>				
Mercara . . . . .	..	..		6.0

TABLE A.—MATERNAL MORTALITY PER 1,000 BIRTHS IN CERTAIN TOWNS.

	1932.		1931.	
	Deaths.	Death rate.	Deaths.	Death rate.
<i>Delhi.</i>				
Delhi City	53	3.3	74	5.0
Delhi Ntd. Area			12	18.8
<i>United Provinces.</i>				
Lucknow .	127	10.2	128	11.0
Agra .	93	7.5	124	10.0
Cawnpore .	128	10.7	96	9.8
Allahabad	70	9.2	81	10.2
Benares .	104	9.4	77	6.9
Moradabad	62	11.0	68	6.9
Aligarh .	29	8.7	47	15.2
Bareilly .	48	7.1	46	6.9
Saharanpur	33	8.4	33	8.9
Hathras .	24	10.7	29	13.4
Muttra .	19	5.9	20	6.4
Muzaffarpur	18	10.5	19	14.0
Meerut .	25	7.8	18	5.6
Jhansi .	16	4.4	18	5.0
<i>Central Provinces.</i>				
Nagpur .	86	7.8	102	10.4
Amraoti .	50	21.7	62	28.2
Raipur .	28	14.3	52	28.6
Burhanpur	23	10.7	45	20.9
Akola .	28	14.8	42	21.2
Jubbulpore	22	5.9	22	6.0
Khamgaon	5	5.2	20	10.8
<i>Bombay Presidency.</i>				
Bombay City	136	4.7	198	7.4
Ahmedabad	209	13.4	195	13.0
Karachi .	109	9.2	127	10.8
Surat .	54	10.6	68	13.6
Sukkur .	38	17.6	54	28.7
Shikarpur	62	26.5	51	23.7
Hyderabad	53	18.2	46	14.8
Poona .	27	5.2	44	8.8
Larkana .	33	42.5	43	51.8
Nasik .	28	23.5	42	34.7
Sholapur .	37	5.6	27	4.5
Satara .	10	21.7	25	55.6
Ahmednagar	19	9.1	23	13.1

# Appendix III.

relating to

## Section III.







TABLE O.—LIST OF LEPER ASYLUMS, HOMES, HOSPITALS AND CLINICS—*concl'd.*

Name of institution.

Class or by whom  
maintained.*Mysore State.*

1. Leper Asylum, Bangalore . . . . .

Indian State.

2. Leper out-patient dispensary, Kalasi palyam

Local and Municipal fund

In addition leprosy Clinics are attached to 2 general dispensaries.

*Travancore State.*

1. Leper Asylum, Neyyur . . . . .

L. M. S. Mission.

2. Leper Asylum, Alleppy . . . . .

C. M. S. Private aided.

3. Leper Asylum, Colachel . . . . .

L. M. S. „

In addition there are 6 leprosy Clinics.

*Cochin State.*

1. Leper hospital, Adoor . . . . .

L. M. S. Mission.

In addition there are 8 leprosy Clinics.

*Assam.*

1. Leper Asylum, Sylhet . . . . .

State-public.

2. Leper hospital, Dhubri . . . . .

Local fund.

3. Leper Colony, Tura . . . . .

State-public.

4. Leper ward, Kohima . . . . .

„

5. Leper Asylum, Kongpokpi . . . . .

Mission.

6. Leper Asylum, Imphal . . . . .

Indian State.

7. Shillong Municipal segregation hospital, at Mawprem.

In addition there are 99 leprosy Clinics ; 45 leprosy Clinics are also maintained by the Public Health Department.

*Burma.*

1. Leper Colony, Monywa . . . . .

State-public.

2. Leper home, Mandalay . . . . .

Private aided.

3. St. John's leper Asylum, Mandalay . . . . .

4. Leper Asylum, Moulmein . . . . .

5. Leper Asylum, Kemmendine, Rangoon

6. Leper Colony, Kengtung . . . . .

In addition there are 12 leprosy Clinics.

*Rajputana.*

There are 6 leprosy Clinics.

TABLE O.—LIST OF LEPROSY ASYLUMS, HOMES, HOSPITALS AND CLINICS—*contd.*

Name of institution.	Class or by whom maintained.
<i>Western India States.</i>	
1. The Prince Albert Victor Asylum Junagadh, Junagadh State.	Indian State.
2. Leprosy Asylum, Bhavnath, Idar State . . . . .	" "
3. Sir Takhatsinhji Anath Ashram dispensary, Adhewada, Bhavnagar State.	" "
4. Leprosy hospital, Morvi . . . . .	" "
<i>Bombay Presidency.</i>	
1. Acworth leprosy Asylum, Matunga, Bombay	Municipal.
2. E. F. Alless leprosy home, Bombay . . . . .	Mission Roman Catholic.
3. Sir D. M. Petit leprosy Asylum, Ratnagiri	D. L. B., Ratnagiri.
4. Leprosy Asylum, Vengurla . . . . .	Mission to leprosy.
5. Leprosy Asylum, Pui, Kolaba district . . . . .	
6. Leprosy Asylum, Poladpur, Kolaba District	
7. Leprosy Asylum, Kondhwa (Poona) . . . . .	
8. Leprosy Asylum, Nasik . . . . .	
9. Leprosy Asylum, Sholapur . . . . .	
10. Leprosy Asylum, Hindalgi, Belgaum . . . . .	
11. Kagrappeth leprosy Asylum, Ahmedabad	Government.
12. Parvatibai leprosy Infirmary, Surat . . . . .	Private.
13. Hiranand leprosy Asylum, Karachi . . . . .	Private.
14. Mrs. Yamunabai leprosy dispensary, Bijapur.	
In addition there are 6 leprosy Clinics.	
<i>Deccan States Agency and Kolhapur Presidency.</i>	
1. The Victoria Diamond Jubilee Asylum, Anuskara (Kolhapur State).	Private aided.
2. The Lepers' Dispensary, Akalkot . . . . .	Indian State.
3. Leprosy Asylum, Miraj . . . . .	Mission to leprosy.
4. Leprosy Asylum, Majgaon (Sawantwadi State) . . . . .	Indian State.
<i>Baroda State.</i>	
1. Leprosy Asylum, Ansuya, Baroda district . . . . .	Indian State.
2. Leprosy Asylum, Dharampur, Dharampur State . . . . .	" "
<i>Hyderabad State.</i>	
1. Leprosy home and hospital, Dichpalli . . . . .	Private aided.
In addition there are 25 leprosy Clinics.	
<i>Madras Presidency.</i>	
1. Mission leprosy hospital, Salur, Vizagapatam district.	
2. Mission leprosy hospital, Vizianagram, Vizagapatam district.	
3. Mission leprosy hospital, Ramachandrapur, East Godavari district.	
4. Mission leprosy hospital, Narsapur, West Godavari district.	
5. Mission leprosy hospital, Bapatla, Guntur district.	
6. Mission leprosy hospital, Kodur, Cuddapah district.	
7. Lady Willingdon Mission leprosy settlement, Tirumani, Chingleput district.	
8. D. N. M. leprosy home, Vadathara, Saloor, South Arcot district.	
In addition there are 347 leprosy Clinics.	

TABLE O.—LIST OF LEPROSY ASYLUMS, HOMES, HOSPITALS AND CLINICS—*contd.*

Name of institution.	Class or by whom maintained.
<i>U. P.</i>	
1. Grace Otway Mayre Leper Asylum, Meerut district . . . . .	Private aided.
2. Leper Asylum, Srinagar, Garhwal district . . . . .	" "
3. Naini leper home, Allahabad . . . . .	" "
4. Leprosy hospital, Lucknow . . . . .	" "
5. Leper Asylum, Agra . . . . .	Local fund.
6. Leper Asylum, Almora . . . . .	Private aided.
7. Aman Sabha leper asylum, Bahraich . . . . .	" "
8. Raja Kali Shanker Asylum, Benares . . . . .	" "
9. Shrimati Bhagwan Dei leper home, Cawnpore . . . . .	" "
10. MacLaren leper hospital, Dehra Dun . . . . .	" "
11. Leper Asylum, Moradabad . . . . .	" "
12. Leper Asylum, Shahjahanpur . . . . .	" "
13. Skin dispensary, Lucknow.	
14. Skin dispensary, Benares.	
15. Skin dispensary, Cawnpore.	
In addition there is one leprosy clinic. Lepers are also treated in all dispensaries as out-door patients.	
<i>B. &amp; O.</i>	
1. K. E. VII Memorial leper asylum, Gaya . . . . .	Private aided.
2. Leper asylum, Muzaffarpore . . . . .	
3. Leper Asylum, Bhagalpur . . . . .	
4. Seldaha leper Colony . . . . .	
5. Rajkumari leper Asylum, Deoghar . . . . .	
6. Leper Asylum, Cuttack . . . . .	
7. Leper Colony, Puri . . . . .	
8. Leper Asylum, Purulia . . . . .	
9. Town branch dispensary of the K. E. VIIth Memorial Asylum, Gaya.	
In addition there are 56 leprosy Clinics.	
<i>Orissa States.</i>	
1. Leper Asylum, Baripada (Mayurbhanj State) . . . . .	Maintained by contribution from State as well as from private persons.
In addition there are 7 leprosy Clinics.	
<i>Bengal.</i>	
1. Albert Victor Hospital, Gobra, Calcutta . . . . .	State-public.
2. Bryan leper home, Bankura . . . . .	Private aided.
3. School of Tropical Medicine, Calcutta.	
In addition there are 76 leprosy Clinics.	
<i>Central India Agency.</i>	
1. Henderson memorial leper home, Dhar, Dhar State . . . . .	Private aided.
2. Sehore leper Asylum (Bhopal State) . . . . .	State-public.
In addition there are 2 hospital leprosy Clinics. Several States also provide special facilities and treat lepers at 14 Hospitals or Dispensaries within their limits.	
<i>C. P.</i>	
1. Bethesda leper home, Champa . . . . .	Private aided.
2. Leper home, Chandkhuri . . . . .	" "
3. Santipur leper home, Dhamtari . . . . .	" "
4. Kothara leper home, Ellichpur . . . . .	" "
5. Victoria leper Asylum, Patpara . . . . .	" "
6. Victoria leper home, Jarhagaon . . . . .	" "
7. Leper home, Raipur . . . . .	" "
In addition there are 30 leprosy Clinics.	

TABLE N.—SANATORIA AND OTHER TUBERCULOSIS INSTITUTIONS.

	No. of beds.
<i>Punjab.</i>	
1. King Edward Sanatorium, Dharampore . . . . .	90
<i>United Provinces.</i>	
1. King Edward VII Sanatorium, Bhowali . . . . .	110
2. Sanatorium, Almora . . . . .	40
<i>Bihar and Orissa.</i>	
1. Itki Sanatorium, Itki . . . . .	50
<i>Bengal.</i>	
1. Tuberculosis Hospital and Sanatorium, Jadabpur . . . . .	70
<i>Central India.</i>	
1. Rao Sanatorium, Indore . . . . .	23
<i>Central Provinces.</i>	
1. Tuberculosis Sanatorium, Pendra Road, Bilaspur . . . . .	55
<i>Bombay.</i>	
1. Turner Sanatorium, Bhoiwada Hill, Parel, Bombay . . . . .	32
2. Bahadurji Sanatorium, Deolali (Bombay) . . . . .	28
3. Hindu Sanatorium, Karla (Bombay) . . . . .	40
4. Bel-air Sanatorium, Panchgani (Bombay) . . . . .	90
5. Hillside Sanatorium, Vengurla (Bombay) . . . . .	25
6. Wanless Tuberculosis Sanatorium, Near Miraj, S. M. C. (Bombay)	50
<i>Madras.</i>	
1. Union Mission Tuberculosis Sanatorium, Near Madanapalle . . . . .	197
2. Government Tuberculosis Institute, Egmore, Madras (Dispensary)	(in 1930)
3. Government Tuberculosis Hospital, Madras . . . . .	80
4. Visrantipuram Tuberculosis Sanatorium, Rajahmundry . . . . .	40
<i>Mysore.</i>	
1. Princess Krishnajammani Sanatorium, Mysore . . . . .	
<i>Rajputana.</i>	
1. Mary Wilson Sanatorium, Tilaunia . . . . .	110

TABLE O.—LIST OF LEPROSY ASYLUMS, HOMES, HOSPITALS AND CLINICS.

*N. W. F. P.*

A special clinic at Lady Reading Hospital, Peshawar.

Cases of leprosy who attend hospitals are also given out-door treatment in the State public, local fund and private aided and non-aided medical institutions in the province.

*Baluchistan.*

Arrangements exist for segregation of leprosy cases at the Civil Hospitals in Quetta and Sibi.

Name of institution.	Class or by whom maintained.
<i>Punjab.</i>	
1. Leprosy home, Ambala city . . . . .	Private aided.
2. Leprosy home, Subathu . . . . .	
3. Leprosy home, Palampur . . . . .	
4. Leprosy home, Tarn Taran . . . . .	
5. Leprosy home, Rawalpindi . . . . .	
6. Leprosy home, Chamba . . . . .	Indian State.

In addition there are 25 leprosy clinics,

TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS—*concl'd.*

## BURMA.

Districts.	Cinchona Febrifug issued in lbs.		Grains per head of population.	
	1931.	1932.	1931.	1932.
Akyab (including Hill District of Arakan)	74.63	114.40	0.82	1.26
Kyaukpyu . . . . .	28.11	14.40	0.89	0.46
Sandoway . . . . .	9.83	6.17	0.53	0.33
Pegu . . . . .	88.46	103.09	1.26	1.47
Tharrawaddy . . . . .	57.87	35.66	0.79	0.49
Hanthawaddy . . . . .	4.11	9.49	0.07	0.16
Insein . . . . .	26.74	26.51	0.56	0.56
Prome . . . . .	31.31	32.11	0.53	0.55
	52.23	70.51	0.64	0.86
Henzada . . . . .	49.37	55.20	0.56	0.63
Myaungmya . . . . .	27.43	25.03	0.43	0.39
Maubin . . . . .	..	1.14	..	0.02
Pyapon . . . . .	28.34	33.49	0.59	0.70
Thaon . . . . .	39.54	33.60	0.52	0.44
Amherst . . . . .	27.77	27.54	0.38	0.38
Tavoy . . . . .	42.40	31.66	1.65	1.23
Mergui . . . . .	57.86	84.69	2.52	3.66
Toungoo . . . . .	125.71	125.83	2.05	2.05
Thayetmyo . . . . .	15.54	11.66	0.40	0.30
Minbu . . . . .	54.63	42.74	1.38	1.08
Magwe . . . . .	8.11	8.00	0.11	0.11
Pakokku . . . . .	11.31	18.06	0.16	0.25
Chin Hills . . . . .	22.86	24.00	0.93	0.98
Mandalay . . . . .	45.71	34.17	0.86	0.64
Kyaukse . . . . .	40.80	6.29	1.89	0.29
Meiktila . . . . .	2.63	6.40	0.06	0.14
Myingyan . . . . .	1.94	0.91	0.03	0.01
Yamethin . . . . .	20.80	5.83	0.37	0.10
Bhamo . . . . .	198.63	235.89	11.47	13.62
Myitkyina. . . . .	68.00	65.83	2.78	2.69
Shwebo . . . . .	12.11	9.14	0.19	0.14
Sagaing . . . . .	1.71	1.03	0.04	0.02
Katha . . . . .	14.29	14.74	0.39	0.41
Upper Chindwin . . . . .	14.06	17.60	0.48	0.63
Lower Chindwin . . . . .	10.06	11.09	0.18	0.20
Northern Shan States. . . . .	273.14	216.23	3.01	2.38
Southern Shan States . . . . .	155.20	285.26	1.17	2.15
Total	1,743.20	1,845.37	0.86	0.88

TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS—*contd.*

## MADRAS.

Districts.	Quinine issued in lbs.		Grains per head of population.	
	1931.	1932.	1931.	1932.
Ganjam . . . . .	..	9	..	3.0
Vizagapatam . . . . .	..	14	..	16.0
Bellary . . . . .	208	193	16.0	19.0
Anantapur . . . . .	..	14	..	1.0
Cuddapah . . . . .	45	42	1.0	2.0
Nellore . . . . .	121	76	3.0	10.0
Chingleput . . . . .	49	51	4.0	3.0
Chittoor . . . . .	..	173	..	5.0
Coimbatore . . . . .	44	31	49.0	35.0
Malabar . . . . .	..	13	..	..
South Kanara . . . . .	272	597	5.0	6.0
Total . . . . .	739	1,213	..	..

## ASSAM.

Cachar . . . . .	48	37	0.6	0.5
Sylhet . . . . .	..	10	..	..
Goalpara . . . . .	226	254	1.8	2.0
Kamrup . . . . .	1,506	1,717	10.8	12.3
Darrang (including Balipara Frontier Tract). . . . .	172	95	2.1	1.1
Nowgong . . . . .	..	21	..	0.3
Sibsagar . . . . .	85	89	0.7	0.7
Lakhimpur . . . . .	96	97	0.9	0.9
Khasi and Jaintia Hills . . . . .	1,714	132	45.0	3.0
Garo Hills . . . . .	47	51	2.0	2.0
Sadiya . . . . .	75	80	11.0	12.0
Naga Hills . . . . .	78	84	3.0	4.0
Lushai Hills . . . . .	183	184	11.0	11.0
Manipur State . . . . .	83	93	1.0	2.0
Total . . . . .	4,313	2,944	4.0	2.6

TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS—*contd.*C. P. & BERAH—*contd.*

Districts.	Quinine issued in lbs.		Grains per head of population.	
	1931.	1932.	1931.	1932.
Nimar . . . . .	147	107	2.2	1.6
Raipur . . . . .	120	134	0.6	0.6
Bilaspur . . . . .	102	69	0.5	0.3
Drug . . . . .	36	50	0.3	0.4
Bhandara . . . . .	92	78	0.8	0.7
Balaghat . . . . .	26	41	0.3	0.5
Amraoti . . . . .	143	193	1.1	1.4
Yeotmal . . . . .	85	97	0.7	0.8
Akola . . . . .	143	184	1.1	1.5
Buldana . . . . .	117	144	1.1	1.3
Total	2,009	2,042	0.9	0.9

## BOMBAY PRESIDENCY.

East Khandesh . . . . .	25	22	0.15	0.13
West Khandesh . . . . .	36	53	0.34	0.50
Surat . . . . .	38	39	0.38	0.39
Broach . . . . .	5	20	0.11	0.40
Kaira . . . . .	12	3	0.10	0.28
Panch Mahals . . . . .	56	58	0.86	0.88
Ahmedabad . . . . .	51	48	0.35	0.33
Ahmednagar . . . . .	9	9	0.06	0.06
Poona . . . . .	12	18	0.07	0.10
Nasik . . . . .	13	15	0.09	0.10
Thana . . . . .	22	19	0.18	0.16
Bombay Suburban . . . . .	5	..	0.01	..
Kolaba . . . . .	9	15	0.10	0.16
Ratnagiri . . . . .	1	12	0.01	..
Belgaum . . . . .	8	16	0.05	0.10
Dharwar . . . . .	20	42	0.13	0.26
Bijapur . . . . .	8	8	0.06	0.06
Kanara . . . . .	67	46	1.12	0.78
Sholapur . . . . .	4	9	0.01	0.07
Satara . . . . .	5	7	0.01	0.04
Karachi . . . . .	85	79	1.20	0.95
Dadu . . . . .	..	18	..	0.38
Hyderabad . . . . .	248	137	2.62	1.50
Nawabshah . . . . .	96	118	1.44	1.80
Thar and Parkar . . . . .	42	90	0.50	1.20
Larkana . . . . .	229	147	3.54	2.20
Sukkur . . . . .	212	151	2.38	1.60
Upper Sind Frontier . . . . .	75	79	2.00	1.80
Total	1,393	1,269	0.4	0.4





TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS—*contd.*U. P.—*contd.*

Districts.	Quinine issued in lbs.		Grains per head of population.	
	1931.	1932	1931.	1932.
Sitapur	11.0	8.5	0.06	0.05
Hardoi	15.5	5.0	0.10	0.03
Kheri	9.5	17.0	0.07	0.12
Fyzabad	14.5	8.5	0.08	0.05
Gonda	10.5	20.5	0.05	0.09
Bahraich	10.5	8.5	0.06	0.05
Sultanpur	12.0	10.5	0.08	0.07
Partabgarh	16.5	9.5	0.13	0.07
Bara Banki	15.0	17.0	0.10	0.07
Total	579.5	455.0	0.10	0.10

B. &amp; O.

Patna .	8.5	8.0	0.03	0.03
Gaya .	17.1	12.4	0.05	0.04
Shahabad	15.1	9.7	0.05	0.03
Bhagalpur	12.7	15.0	0.04	0.05
Monghyr .	11.4	12.9	0.03	0.04
Purnea .	37.1	40.5	0.10	0.10
Santal Parganas	25.3	34.6	0.09	0.10
Muzaffarpur .	15.1	10.2	0.04	0.02
Saran . .	6.9	5.9	0.02	0.02
Champaran	26.7	10.6	0.09	0.03
Darbhanga	12.8	8.0	0.03	0.02
Ranchi .	34.9	17.5	0.20	0.08
Hazaribagh	21.1	14.9	0.10	0.07
Manbhum	18.5	20.7	0.07	0.08
Singhbhum	131.2	146.7	1.00	1.10
Palamau .	3.4	2.5	0.02	0.02
Cuttack .	47.2	32.6	0.20	0.10
Puri .	26.6	16.9	0.20	0.10
Balasore .	34.2	18.9	0.20	0.10
Sambalpur	15.9	11.7	0.10	0.09
	14.7	5.1	0.50	0.20
Total	536.4	455.3	0.1	0.1

TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS—*contd.*

## U. P.

Districts.	Quinine issued in lbs..		Grains per head of population.	
	1931.	1932.	1931.	1932.
Dehra Dun	4.5	14.0	0.14	0.42
Saharanpur	13.0	20.0	0.09	0.13
Muzaffarnagar	3.5	12.0	0.03	0.09
Meerut	5.0	5.5	0.02	0.02
Bulandshahr	3.5	3.0	0.02	0.02
Aligarh	30.0	11.0	0.18	0.06
Muttra	6.0	10.5	0.06	0.11
Agra	4.0	5.0	0.03	0.03
Mainpuri	3.5	3.5	0.03	0.03
Etah	2.0	1.0	0.02	0.01
Bareilly	11.5	18.0	0.07	0.12
Bijnor	3.5	5.0	0.03	0.04
Budaun	7.5	4.5	0.05	0.03
Moradabad	7.5	4.0	0.04	0.02
Shahjahanpur	9.5	5.0	0.07	0.04
Pilibhit	9.5	5.0	0.14	0.08
Farrukhabad	11.5	6.0	0.09	0.05
Etawah	8.0	5.5	0.07	0.05
Cawnpore	27.0	15.5	0.15	0.09
Fatehpur	52.0	4.5	0.53	0.04
Allahabad	22.5	11.0	0.11	0.05
Banda	11.0	9.5	0.12	0.11
Hamirpur	1.5	2.0	0.02	0.03
Jhansi	20.0	20.0	0.20	0.20
Jalaun	0.5	2.0	0.01	0.03
Benares	10.5	7.5	0.07	0.05
Mirzapur	10.0	7.5	0.09	0.07
Jaunpur	20.0	12.0	0.12	0.07
Ghazipur	11.0	5.0	0.09	0.04
Ballia	7.5	4.0	0.05	0.03
Gorakhpur	16.5	8.0	0.03	0.01
Basti	16.0	10.0	0.05	0.03
Azamgarh	13.0	12.5	0.06	0.05
Naini Tal	16.0	53.5	0.40	1.35
Almora	4.5	0.5	0.05	0.01
Garhwal	11.0	2.0	0.15	0.02
Lucknow	19.0	12.0	0.17	0.11
Enao	20.0	4.5	0.16	0.04
Bara Bareilly	11.5	8.0	0.08	0.06

TABLE M.—QUININE ISSUED BY PUBLIC HEALTH DEPARTMENTS.

N. W. F. P.

Districts.	Total issued in lbs.		Grains per head of population.	
	1931.	1932.	1931.	1932.
Peshawar .	295	313	2.4	2.5
Kohat .	96	125	3.2	4.2
Bannu .	51	47	1.5	1.4
D. I. Khan	37	64	1.0	1.8
Hazara .	36	39	0.4	0.5
Total	520		1.5	1.7

## PUNJAB.

Hissar .	12	17½	0.09	0.14
Rohtak .	70	10	0.61	0.09
Gurgaon .	43	19	0.41	0.18
Karnal .	64	23	0.53	0.19
Ambala .	29		0.28	0.56
Simla .			..	..
Kangra .	10	45	0.09	0.39
Hoshiarpur	84	96	0.57	0.65
Jullundur	31	40	0.23	0.30
Ludhiana .	29	64	0.30	0.67
Ferozepore	41	430	0.25	2.63
Lahore .	215	33	1.12	0.17
Amritsar .	109	66	0.68	0.41
Gurdaspur	74	33	0.53	0.24
Sialkot .	45	22	0.32	0.16
Gujranwala	50	27	0.48	0.26
Sheikhupura	52	21	0.52	0.21
Gujrat .	24	8	0.18	0.06
Shahpur .	59	33½	0.50	0.29
Jhelum .	5	5	0.07	0.07
Rawalpindi	48	23	0.54	0.26
Attock .	8	20	0.10	0.24
Mianwali .	16	10	0.27	0.17
Montgomery	150	98	1.05	0.69
Lyalpur .	70	67	0.43	0.41
Jhang .	38	32	0.40	0.34
Multan .	37	40	0.22	0.24
Muzaffargarh .	24	3	0.28	0.04
Dera Ghazi Khan	21	27	0.30	0.38
Total	1,458	1,371	0.44	0.41

TABLE K.—DEATHS FROM RESPIRATORY DISEASES IN RURAL AND URBAN AREAS.

	Deaths.		Death rate p.m.		Deaths from pulmonary tuberculosis		Death rate p.m.	
	R.	U.	R.	U.	R.	U.	R.	U.
British India	275,483	138,441	405,924	1.1	4.0	1.5	1.6	1.6
N.W. P. P.	1,866	1,228	3,094	0.9	4.0	1.3	0.9	1.3
Punjab	46,187	14,064	60,251	2.2	4.2	3.3	2.2	3.3
Dahli	1,057	2,958	4,015	6.2	6.6	6.2	5.0	5.0
U. P.	8,659	28,971	38,780	0.2	6.6	0.7	0.7	0.7
B. & O.	4,915	697	5,612	0.1	0.5	0.1	0.2	0.1
Bengal	46,248	16,001	62,249	1.0	4.5	1.2	1.0	1.0
C. P.	5,121	30,411	35,532	1.8	3.0	2.0	2.7	2.7
Romlay	25,290	93,411	118,701	8.5	7.2	4.2	4.9	4.9
Madras	70,731	22,531	93,262	1.8	3.9	2.0	2.1	2.1
Coorg	70	194	264	0.5	20.0	1.0	1.3	1.3
Assam	4,049	409	5,358	0.6	2.1	0.7	0.7	0.7
Burma	3,468	3,344	11,880	0.3	5.9	1.0	1.0	1.0
Ajmer-Merwara	22	1,282	1,304	0.1	7.2	2.3	0.6	0.6

\* In towns.

TABLE L.—DEATHS FROM RESPIRATORY DISEASES BY MONTHS.

	Jan.	Feb.	Mar.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	
														R.	U.
British India	38,996	35,087	35,171	31,496	30,246	28,430	27,786	28,454	33,051	35,356	38,105	42,826	1,465,924	1.5	1.6
N.W. P. P.	413	250	137	280	258	247	255	195	305	287	173	311	3,094	1.3	1.0
Punjab	6,160	6,717	7,582	4,767	4,144	3,894	3,221	3,423	4,349	5,562	5,962	7,502	60,251	2.5	2.4
Dahli	863	374	347	279	314	354	240	351	351	304	381	627	4,015	6.2	6.8
U. P.	8,955	2,908	2,868	2,766	2,837	3,118	2,923	2,931	2,815	2,311	2,768	3,275	33,730	0.7	0.8
B. & O.	5,217	5,200	5,652	4,650	4,447	4,322	4,283	4,440	4,712	5,366	6,005	7,556	62,249	1.2	1.2
Bengal	5,727	5,200	5,417	4,791	4,390	3,906	4,460	4,860	4,712	5,366	6,005	7,556	62,249	1.2	1.2
C. P.	2,807	2,678	2,610	2,454	2,145	1,989	1,796	2,076	2,087	2,901	3,058	3,181	30,411	2.9	2.7
Romlay	9,331	8,176	8,118	7,513	7,140	6,393	6,243	6,817	7,945	8,290	9,123	9,624	93,411	4.9	4.9
Madras	8,255	7,690	7,097	7,070	7,804	7,712	7,735	7,564	7,968	7,560	8,310	9,189	93,262	2.6	2.6
Coorg	27	19	25	29	29	21	21	20	18	20	16	18	264	1.6	1.6
Assam	613	493	539	398	398	462	410	446	381	476	462	411	5,358	0.7	0.7
Burma	1,069	840	902	725	725	836	945	961	1,040	1,101	1,274	1,512	11,880	1.5	1.5
Ajmer-Merwara	91	143	128	85	100	74	76	86	86	94	112	112	1,304	1.5	1.5

TABLE I.—DEATHS FROM DYSENTERY AND DIARRHOEA IN RURAL AND URBAN AREAS.

	Deaths.			Death rate p.m.			Deaths from dysentery.			Death rate p.m.	
	R.	U.	Total.	R.	U.	Total.	R.	U.	Total.	R.	U. Total.
British India . . . .	176,195	46,609	222,804	0.7	1.8	0.8	1.0	..	..	..	..
N.W. F. P. . . . .	299	280	529	0.1	0.7	0.2	0.1	..	..	..	..
Punjab . . . . .	9,620	3,667	13,287	0.5	1.2	0.6	0.5	*679	..	..	..
Delhi . . . . .	84	415	499	0.4	0.9	0.8	..	29	404	483	0.2 0.9 0.7
U. P. . . . .	1,690	8,003	19,893	0.1	2.1	0.3	0.2	3,304	2,855	5,659	0.1 0.6 0.1
B. & O. . . . .	14,770	9,048	15,727	0.7	1.0	0.8	0.7	17,319	8,720	21,559	0.4 1.0 0.4
Bengal . . . . .	32,900	6,662	39,562	0.7	1.0	0.8	..	..	..	..	..
C. P. . . . .	20,458	3,085	23,493	1.5	1.8	1.5	2.3	3,836	405	8,741	0.2 0.2 0.2
Bombay . . . . .	17,488	5,122	22,610	1.0	1.2	1.0	1.3	2,605	1,198	3,803	0.2 0.3 0.2
Madras . . . . .	64,469	15,941	80,410	1.0	2.6	1.7	1.8	..	..	..	0.2 2.7 0.3
Coorg . . . . .	62	48	110	0.4	5.0	0.7	..	26	55	..	..
Assam . . . . .	7,832	409	8,241	1.0	2.1	1.3	1.2	..	*287	..	..
Burma . . . . .	1,840	5,161	6,991	0.8	1.3	0.4	0.7	..	..	..	..
Almer-Merwara . . . .	8,311	309	8,620	0.1	1.6	0.5	0.3	..	..	..	..

\* For 13 municipal towns in charge of whole time health officers.

† In 13 larger towns.

TABLE J.—DEATHS FROM DYSENTERY AND DIARRHOEA BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m. 1932. 1931.
British India	20,371	15,980	14,795	14,913	15,787	16,389	18,577	22,414	29,523	20,948	19,198	20,154	222,804	0.8 1.0
N.W. F. P.	17	12	29	17	17	10	33	48	185	90	35	27	529	0.2 0.1
Punjab	1,028	772	867	980	1,003	1,096	995	1,181	1,547	1,604	1,228	1,156	13,287	0.6 0.6
Delhi	28	13	25	30	31	32	21	56	100	64	68	25	499	0.8 0.8
U. P.	660	649	720	930	1,205	1,303	1,024	1,427	1,907	1,350	907	764	19,893	0.3 0.3
B. & O.	1,851	1,514	1,313	1,121	1,348	1,764	1,337	1,542	1,932	1,090	1,102	1,213	15,727	0.4 0.4
Bengal	4,170	3,840	2,903	3,092	2,064	2,684	3,136	3,285	3,024	3,173	3,597	4,144	39,562	0.8 0.9
C. P.	2,901	1,097	1,439	1,490	1,932	1,764	1,371	2,410	3,776	2,291	2,118	1,571	23,493	1.5 0.9
Bombay	1,846	1,146	1,095	1,187	1,303	1,349	1,064	2,277	3,048	1,623	1,623	1,623	3,803	1.0 1.2
Madras	8,649	6,144	5,619	5,077	5,029	5,099	5,092	7,331	6,948	6,582	6,889	8,551	80,410	1.0 1.2
Coorg	7	4	11	15	21	11	7	4	10	10	8	7	110	0.7 0.7
Assam	545	448	640	574	565	768	768	655	701	800	645	645	8,241	1.3 1.2
Burma	305	297	326	338	400	388	438	448	436	439	375	386	5,191	0.4 0.5
Almer-Merwara	8	12	18	25	35	10	18	65	26	19	20	20	309	0.6 0.6

TABLE G.—DEATHS FROM FEVERS AND MALARIA.

	Fever deaths.		Mean 1927-31.	Death rate p.m.		Malaria deaths.		Death rate p.m.	
	R.	U. Total.		R.	U. Total.	R.	U. Total.	R.	U. Total.
<b>British India</b>		3,272,498 183,543 8,456,145	15.0	135	6.9 12.9	..	..	..	..
N.-W. F. P.		35,887 2,695 38,582	16.8	17.8	8.4 16.1	..	..	..	..
Punjab		357,434 30,993 388,427	17.8	17.8	11.2 17.8	..	..	..	..
Delhi		3,889 3,916 7,805	13.2	16.8	8.8 11.2	..	..	..	..
U. P.		802,622 49,684 852,306	18.8	17.8	13.1 17.6	..	..	..	..
B. & O.		55,136 3,503 58,639	16.2	16.2	6.7 14.8	..	..	..	..
Bengal		677,310 35,963 713,273	14.7	14.5	8.9 18.8	..	..	..	..
C. P.		220,733 17,010 237,743	18.8	16.7	10.1 15.1	..	..	..	..
Bombay		172,823 22,483 195,306	10.8	9.6	5.3 8.8	..	..	..	..
Madras		269,244 25,072 294,316	8.0	6.7	4.1 6.3	..	..	..	..
Coorg		2,854 60 2,914	21.4	18.7	6.2 18.0	..	..	..	..
Assam		97,210 1,001 98,211	11.2	12.4	5.1 12.2	..	..	..	..
Burma		71,279 4,618 75,897	7.6	21.8	1.3 7.6	..	..	..	..
Ajmer-Merwara		7,960 2,974 10,934	19.4	29.8	16.0 19.4	..	..	..	..

TABLE H.—DEATHS FROM FEVERS BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.	
														1932.	1931.
<b>British India</b>	319,391	292,815	296,881	266,951	276,813	289,435	295,428	258,478	292,337	305,130	338,911	338,792	3,456,145	12.9	14.9
N.-W. F. P.	5,636	3,344	3,239	2,938	2,915	2,405	2,482	2,457	2,900	3,825	3,630	4,030	38,582	15.1	10.5
Punjab	40,192	31,040	30,769	25,208	30,130	31,331	25,952	20,167	35,078	39,823	35,008	36,694	388,427	16.2	17.8
Delhi	377	355	450	614	722	1,328	360	482	688	651	669	679	7,805	11.2	11.0
U. P.	71,197	66,921	53,802	74,216	74,810	92,091	71,432	60,913	68,089	69,991	68,897	65,569	853,956	17.5	21.2
B. & O.	46,708	40,793	66,896	43,476	48,894	45,795	45,588	48,901	50,962	48,073	50,486	59,900	564,603	14.8	14.7
Bengal	71,197	56,921	53,802	50,764	47,647	41,882	45,338	40,443	51,692	59,498	75,719	87,610	691,513	13.8	14.7
C. P.	16,815	15,614	16,157	17,692	20,506	20,591	18,193	16,069	24,989	27,116	24,876	24,242	297,748	15.1	19.0
Bombay	17,387	16,157	14,698	15,631	15,287	12,214	12,925	15,129	17,881	18,368	11,125	19,538	195,251	8.8	8.9
Madras	29,933	23,115	23,224	21,200	21,683	23,852	22,649	22,844	24,689	23,668	22,070	23,716	231,416	6.3	7.8
Coorg.	225	233	233	332	292	299	225	240	219	248	237	204	2,944	18.0	17.0
Assam	7,494	6,768	6,147	6,523	8,446	9,394	9,890	9,062	8,822	8,406	8,716	9,113	98,211	12.2	11.8
Burma	7,038	5,318	5,927	5,268	4,331	4,831	6,451	6,869	7,094	7,495	7,715	5,988	75,897	6.2	6.2
Ajmer-Merwara	973	1,057	1,124	846	975	739	511	532	1,240	540	328	384	10,934	19.4	25.9

TABLE E.—DEATHS FROM SMALLPOX IN RURAL AND URBAN AREAS.

	Deaths.		Total.	Death rate p.m.		Mean 1927-31.	Deaths in children.		Percentage of deaths to total mortality.				
	R.	U.		R.	U.		Total.	Under 1 year.	1-10 years.	Under 1 year.	1-10 years.	Total.	
British India	36,612	8,313	44,925	0.1	0.3	0.2	0.3	6,519	10,633	17,152	14.6	23.7	138.3
N.W. P.	355	158	513	0.2	0.5	0.2	0.1	108	323	431	21.0	63.0	84.0
Punjab	3,276	1,908	5,184	0.2	0.6	0.2	0.3	1,881	2,303	4,184	36.3	44.4	80.7
Delhi	11	172	183	..	0.4	0.3	0.6	60	106	166	32.8	58.0	90.8
U. P.	2,302	477	2,779	0.1	0.1	0.2	0.2	694	1,030	1,624	21.7	37.4	59.1
B. & O.	15,825	641	16,466	0.4	0.4	0.4	0.4	1,261	2,054	3,315	7.7	10.1	23.8
Bengal	6,716	1,194	7,910	0.1	0.3	0.2	0.5	170	398	568	2.2	5.0	7.2
C. P.	463	121	584	0.1	0.1	0.1	0.2	175	295	470	30.5	46.2	76.7
Bombay	2,078	621	2,699	0.1	0.1	0.1	0.5	448	1,017	1,465	16.6	37.7	54.3
Madras	5,761	1,402	7,163	0.1	0.2	0.1	0.2	1,435	1,686	3,121	27.1	31.4	58.5
Coorg	..	1	1	..	0.1	..	0.2	..	..	..	..	..	..
Assam	625	6	631	0.1	0.1	0.1	0.4	56	94	150	9.0	15.0	24.0
Burma	1,100	1,378	2,478	0.1	1.0	0.2	0.1	301	748	1,049	12.1	30.1	42.2
Ajmer-Marwara	104	34	138	0.3	0.2	0.2	0.9	Not available.	..	..	..	..	..

TABLE F.—DEATHS FROM SMALLPOX BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p. m. 1932, 1931.
British India	1,846	2,704	4,271	5,244	6,501	8,336	4,527	2,840	1,792	1,627	2,303	5,035	44,925	0.2 0.1
N.W. P.	10	10	17	21	47	42	10	42	43	86	142	513	0.2	0.2
Punjab	203	207	217	420	632	430	211	122	141	941	1,703	5,184	0.2	0.2
Delhi	..	..	2	1	8	1	..	..	..	8	106	166	0.3	..
U. P.	135	163	289	367	504	312	175	43	28	50	182	2,770	0.1	0.1
B. & O.	696	842	1,420	2,560	2,916	1,900	1,022	606	485	768	1,491	10,400	0.4	0.2
Bengal	372	574	951	1,221	1,404	1,021	654	474	258	252	437	7,910	0.3	0.2
C. P.	41	66	65	64	90	88	65	44	14	8	13	10	574	0.3
Bombay	83	214	306	348	311	325	291	147	110	90	136	332	2,090	0.1 0.1
Madras	831	843	457	387	422	396	683	949	448	488	308	491	5,393	0.1 0.1
Coorg	..	..	..	..	1	..	..	..	..	..	..	..	1	0.1
Assam	83	51	68	70	132	62	60	54	24	32	84	16	631	0.1 0.1
Burma	83	107	485	593	636	281	131	58	44	16	11	40	2,484	0.2 0.2
Ajmer-Marwar	11	10	32	21	12	25	8	1	..	7	11	138	0.2 1.3	0.2 1.3



TABLE D.—DEATHS FROM PLAGUE BY MONTHS.

## (i).—British Provinces.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m.
	1881.												1882.	1881.
Grand Total	5,777	6,840	13,782	12,096	2,942	693	674	1,398	1,963	2,074	2,433	4,553	55,281	0.2
British India	7,481	9,673	11,068	9,924	2,908	1,006	1,799	3,307	4,130	4,568	4,968	6,260	68,690	0.2
N. W. P. P.	4,453	5,955	19,018	11,602	2,847	563	285	497	915	950	1,894	3,187	46,026	0.2
Punjab	5,878	8,311	9,743	6,936	2,323	639	818	1,610	2,296	2,681	2,906	3,475	46,504	0.2
Delhi	78	174	260	780	498	67	46	..	..	19	18	68	2,003	0.1
H. P.	..	..	..	..	..	..	..	..	..	..	..	..	1,150	0.1
B. & O.	8,124	5,162	6,557	4,414	1,425	281	38	10	20	45	127	204	21,497	0.4
Bengal	682	911	1,108	430	183	6	2	..	2	1	6	85	3,374	0.1
C. P.	..	..	..	..	..	..	..	..	..	..	..	..	5,429	0.1
Romby	490	537	621	181	14	..	..	22	66	60	48	44	1	..
Madras	798	791	622	291	128	105	587	1,448	2,030	2,444	2,607	2,877	2,008	0.1
Coorg	100	141	103	47	18	68	129	118	167	106	171	310	1,440	0.7
Assam	..	..	..	..	6	2	..	..	..	..	1	2	1,562	0.1
Burma	331	435	441	84	14	16	16	14	11	6	33	95	8	0.1
Ajmer-Merwara	..	..	..	..	..	..	..	..	..	..	..	..	1,556	0.1
Total	1,824	905	764	434	95	180	439	991	1,048	1,124	1,069	1,422	9,655	0.1
Punjab	..	..	..	..	..	..	..	..	..	..	..	..	..	..
B. & O.	107	58	225	688	385	377	961	1,097	1,834	1,885	2,062	2,775	17,186	0.1
Bengal	..	..	..	160	57	38	..	..	..	..	..	..	645	0.1
C. P.	..	..	..	..	..	..	..	..	..	..	..	..	614	0.1
Bomby	402	368	257	122	91	126	388	699	791	788	844	1,185	5,919	0.1
Madras	1,122	889	559	10	..	..	1	..	..	..	..	..	1,562	0.1
Bangalore, C. & M. Station	20	34	10	252	159	200	486	819	762	585	662	757	11	2
Hyderabad	87	92	115	2	1	1	..	14	6	5	5	8	7,232	0.1
C. I. Agency	..	..	..	..	..	..	..	..	..	..	..	..	101	0.1
Baroda	3	11	46	17	28	2	76	262	271	501	576	762	2,809	0.1
Rajputana	..	..	..	..	..	..	..	..	..	..	..	..	5	0.1
Assam	..	..	..	..	..	..	..	..	..	..	..	..	150	0.1
Burma	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Jaunpur & Kaimir	2	..	..	..	..	..	..	..	..	..	..	..	19	0.1
Baluchistan	12	10	73	153	47	7	..	..	..	..	..	..	265	0.1
	..	..	..	..	..	..	..	..	..	..	..	..	115	..

## (ii).—Indian States and Agencies.

Total	1881.	1,824	905	764
Punjab	..	..	..	..
B. & O.	..	107	58	225
Bengal	..	..	..	..
C. P.	..	..	..	..
Bomby	..	402	368	257
Madras	..	1,122	889	559
Bangalore, C. & M. Station	..	20	34	10
Hyderabad	..	87	92	115
C. I. Agency	..	..	..	..
Baroda	..	3	11	46
Rajputana	..	..	..	..
Assam	..	..	..	..
Burma	..	..	..	..
Jaunpur & Kaimir	..	2	..	..
Baluchistan	..	12	10	73

TABLE B.—DEATHS FROM CHOLERA IN RURAL AND URBAN AREAS.

	Deaths.			Rate p.m.			Mean 1927-31.	Total Villages.	Number infected.
	R.	U.	Total.	R.	U.	Total.			
<b>British India</b>	62,309	4,910	67,219	0.3	0.2	0.2	1.2	486,180	17,543
N. W. F. P.	58	12	70	..	..	..	0.1	2,802	2
Punjab	380	234	614	..	0.1	..	0.2	34,520	168
Delhi	..	4	4	..	..	..	0.1	304	..
U. P.	8,633	1,101	9,734	0.2	0.3	0.2	0.9	105,640	1,551
B. & O.	9,093	255	9,348	0.3	0.2	0.2	2.2	105,404	2,534
Bengal	31,511	2,399	33,910	0.7	0.1	0.1	1.9	86,369	10,087
C. P.	843	11	854	0.1	..	..	1.0	39,874	118
Bombay	1,242	111	1,353	..	..	..	0.8	30,749	236
Madras	4,621	657	5,278	0.1	0.1	0.1	0.8	33,587	1,366
Coorg	..	..	..	..	..	..	..	..	..
Assam	4,896	76	4,971	0.6	0.4	0.6	1.1	28,323	1,233
Burma	1,033	49	1,082	0.1	..	0.1	0.4	11,568	179
Ajmer-Merwara	..	1	1	..	..	..	0.1	739	1

TABLE C.—DEATHS FROM CHOLERA BY MONTHS.

	Deaths.			Rate p.m.			Total.	Rate p.m. 1932, 1931.								
	Jan.	Feb.	Mar.	April.	May.	June.										
British India	13,535	7,371	5,545	6,413	5,076	3,653	4,344	6,077	6,009	3,506	2,335	3,738	67,219	230,969	0.2	0.8
N. W. F. P.	..	..	1	..	..	45	110	218	177	47	..	..	70	105	..	..
Punjab	..	..	..	..	..	..	2	1	1	..	..	..	614	391	..	0.1
Delhi	..	..	..	..	..	..	..	..	..	..	..	..	4	61	..	..
U. P.	89	17	182	272	351	708	1,158	1,622	3,243	1,472	319	76	9,734	31,118	0.2	0.6
B. & O.	45	865	353	765	700	735	1,193	1,847	906	574	707	700	9,348	40,943	0.2	1.1
Bengal	..	6,372	5,037	3,858	3,012	1,463	1,282	1,090	841	614	806	2,338	33,910	79,073	0.1	1.6
C. P.	8	12	6	0	4	27	44	186	375	154	23	10	854	14,195	..	0.9
Bombay	..	..	..	0	8	14	17	90	137	187	427	357	1,363	79,073	..	1.6
Madras	..	..	..	221	119	119	49	52	21	19	6	25	5,678	30,232	0.1	0.7
Goorg	..	..	..	..	..	..	..	..	..	..	..	..	..	116	..	..
Assam	585	390	350	739	784	466	611	540	284	120	94	159	4,971	5,523	0.6	0.7
Burma	..	40	156	350	50	43	28	70	15	10	2	..	1,082	532	0.1	..
Ajmer-Merwara	..	..	..	1	..	..	..	..	..	..	..	..	1	32	..	0.1

TABLE A.—DEATHS FROM CHOLERA FROM 1901 TO 1932.

Year.	British India.	N.-W. India.	Punjab, Delhi.	U. P. B. & O.	Bengal.	O. P. Bombay.	Madras, Coorg.	Assam.	Burma, Mymer.	Indian States.								
										Raj-putana, India.	Central Hydrabad, India.	Mysoor.						
1901	971,510	117	171	9	53,995	404,429	64,324	66	13,000	81,970	53	7,408	3,552	50	0	72	1	11,351
1902	924,130	117	387	4	25,160	60,174	90,797	44	3,230	29,769	..	12,653	1,901	82	1,519	12	..	218
1903	312,354	1,354	14,366	822	47,159	109,590	93,846	437	1,825	27,933	..	8,800	8,233	..	236	1,110	..	99
1904	192,835	1	714	2	6,617	35,241	102,400	9,997	10,154	23,109	..	5,583	2,950	..	1	160	..	471
1905	171,785	300	2,197	..	121,790	98,590	175,178	1,217	5,396	18,898	..	23,833	2,947	..	8	97	64	67
1906	693,321	..	4,107	127	149,549	131,671	135,621	33,768	40,119	142,311	10	33,682	7,872	254	4,714	10,147	1,001	7,222
1907	408,102	268	429	8	22,498	115,901	153,109	4,201	7,699	31,565	137	8,392	7,078	1	64	41	1	4,972
1908	591,725	2,845	120	177	32,544	132,277	129,412	7,987	17,779	63,449	..	23,859	11,971	737	737	1,930	937	2,149
1909	239,231	134	1,401	12	21,823	32,011	58,356	7,087	39,714	39,224	99	5,351	11,950	..	403	1,421	104	1,059
1910	430,451	1,605	2,190	1	102,402	126,332	119,086	5,316	3,094	32,394	56	24,512	2,011	2	8	2,384	2	1,312
1911	353,005	12	1,313	47	117,680	38,333	93,467	2,998	5,317	93,174	6	7,475	4,191	50	85	1,054	903	210
1912	407,769	1,329	1,333	406	18,394	77,023	93,467	3,413	6,595	92,497	..	14,903	7,136	13	414	9,080	1,100	6,748
1913	394,315	175	5,311	37	60,427	70,379	78,898	15,236	5,134	37,780	192	16,407	4,339	..	4,035	2,323	1,322	8,092
1914	290,739	2,777	6,566	12	32,493	38,115	86,224	20,345	17,779	63,449	..	9,270	2,073	9	1,437	10,075	5,393	840
1915	404,472	392	13,196	92	90,593	83,349	130,679	5,602	377	30,093	..	26,979	17,037	3	1,951	795	2,072	178
1916	283,047	194	1,651	69	33,300	90,582	70,836	39,205	19,841	16,735	1	13,099	1,773	801	5,075	5,474	1,475	137
1917	237,002	21	1,385	12	21,440	109,030	45,021	691	17,033	53,383	32	10,553	1,914	12	69	485	7,200	3,153
1918	560,602	31	257	8	119,746	205,584	32,379	3,351	8,334	322,293	1	14,077	4,269	7	3	489	2,579	7,232
1919	578,428	4,400	8,581	66	31,905	104,727	124,949	62,089	51,551	92,262	167	33,030	13,300	59	342	8,309	13,321	2,306
1920	130,140	2	138	7	6,166	27,263	68,106	3,491	2,047	31,339	6	2,431	3,396	1	508	278	57	230
1921	450,608	4,285	19,215	635	67,000	77,450	48,514	9,704	8,236	51,971	24	16,182	8,038	32	644	1,407	3,854	7,699
1922	121,679	92	123	6	2,330	24,805	51,712	64	2,768	16,502	4	16,219	5,047	2	..	..	..	..
1923	73,002	9	3,351	121	2,691	31,108	41,453	1,090	9,221	51,699	..	8,753	1,433	9	9	62	1,174	79
1924	233,707	2	11,236	16	28,235	49,022	118,377	10,311	26,153	35,384	..	15,392	4,238	4	1,357	2,554	8,913	1,367
1925	115,645	116	8,049	50	7,653	17,336	34,276	124	57	44,815	4	8,293	1,932	..	..	43	22	..
1926	133,151	..	87	18	6,166	27,263	68,106	4,595	78	24,407	2	10,235	1,823	..	..	269	716	6
1927	304,710	2	11,236	16	28,235	49,022	118,377	10,311	26,153	35,384	..	15,392	4,238	4	1,357	2,554	8,913	1,367
1928	351,305	..	2,934	34	44,941	77,103	135,945	12,108	6,881	57,677	1	6,915	7,209	68	1,371	7,520	4,314	413
1929	295,454	30	2,909	193	50,924	104,024	81,093	10,084	9,084	25,846	..	7,765	7,070	20	722	1,155	450	140
1930	337,332	449	1,131	8	61,334	155,215	64,993	23,250	15,142	18,746	..	6,332	601	41	2,101	11,165	18,369	535
1931	229,909	105	301	61	31,118	40,943	79,073	14,135	18,646	30,232	116	5,523	534	32	204	1,411	5,053	6,385
1932	67,291	70	614	4	9,734	9,348	33,910	854	1,353	5,278	..	4,971	1,039	1	100	100	100	100

**Appendix II.**  
**Relating to**  
**Section II.**

---

TABLE O.—INFANTILE DEATH RATES OF 200 AND OVER PER 1,000 LIVE-BIRTHS  
IN TOWNS—*concl'd.*

<i>Madras Presidency—contd.</i>		<i>Burma—contd.</i>	
Rajahmundry . . . . .	257	Magwe . . . . .	316
Masulipatam . . . . .	241	Thingangyun . . . . .	315
Madras . . . . .	239	Zigon . . . . .	314
Palamcottah . . . . .	232	Naunglebin . . . . .	303
Tuticorin . . . . .	232	Prome . . . . .	300
Cocanada . . . . .	224	Moulmeingyun . . . . .	300
Madura . . . . .	224	Salin . . . . .	295
Bezpada . . . . .	221	Mandalay . . . . .	290
Guntur . . . . .	219	Nyaung-u . . . . .	288
Chidambaram . . . . .	216	Insein . . . . .	288
Tirupati . . . . .	214	Rangoon . . . . .	286
Nellore . . . . .	211	Henzada . . . . .	284
Negapatam . . . . .	209	Paungde . . . . .	283
Palacole . . . . .	207	Kyaiklat . . . . .	283
Virudhunagar . . . . .	202	Yamethin . . . . .	282
Cuddalore . . . . .	201	Pyinmana . . . . .	282
Karaikudi . . . . .	200	Akyab . . . . .	271
		Maubin . . . . .	270
		Myinmu . . . . .	268
		Wakema . . . . .	263
		Monywa . . . . .	262
<i>Burma.</i>		Danubyu . . . . .	260
Taungdwingyi . . . . .	551	Allanmyo . . . . .	259
Pyawbwe . . . . .	439	Kanbe . . . . .	254
Gyobingauk . . . . .	419	Minbya . . . . .	253
Myingyan . . . . .	411	Thronze . . . . .	251
Myanaung . . . . .	392	Pyu . . . . .	235
Kawkareik . . . . .	374	Myaungmya . . . . .	234
Chauk . . . . .	367	Ngathainggyaung . . . . .	233
Thayetmyo . . . . .	366	Minbu . . . . .	233
Yenangyaung . . . . .	348	Bassein . . . . .	231
Kamayut . . . . .	347	Kyaungin . . . . .	230
Kyaukse . . . . .	341	Thamaing . . . . .	228
Meiktila . . . . .	337	Kyaikto . . . . .	226
Myitnge . . . . .	333	Ye-u . . . . .	222
Pakokku . . . . .	330	Shwedaung . . . . .	221
Sagaing . . . . .	326	Pyapon . . . . .	213
Letpadan . . . . .	323	Pegu . . . . .	211
Yandoon . . . . .	318		
Shwebo . . . . .	318		

TABLE O.—INFANTILE DEATH RATES OF 200 AND OVER PER 1,000 LIVE-BIRTHS  
IN TOWNS—*contd.*

<i>Bengal Presidency—contd.</i>		<i>Central Provinces—contd.</i>	
Kotchchandpur	238	Digras . . . . .	210
South Suburban	234	Akola . . . . .	210
Howrah	225	Barsi Takli . . . . .	210
Chandrakona	222	Chanda . . . . .	209
Kotwa . . . . .	221	Malkapur . . . . .	208
Nator . . . . .	211	Kamptee . . . . .	208
Bansheria . . . . .	209	Gondia . . . . .	207
		Nandgaonpeth . . . . .	207
		Dattapur . . . . .	206
<i>Central Provinces.</i>		Seoni . . . . .	204
Jalgaon . . . . .	796	Paratwada . . . . .	201
Karehgunj . . . . .	306	Sendurjana . . . . .	200
Bhatpara . . . . .	298		
Drug . . . . .	291	<i>Bombay Presidency.</i>	
Arang . . . . .	278	Hyderabad Cantt. . . . .	474
Jubbulpore Cantt. . . . .	277	Nawabshah . . . . .	461
Saugor Cantt. . . . .	273	Nadiad . . . . .	367
Sobagpur . . . . .	270	Pandharpur . . . . .	337
Murwara . . . . .	269	Poona city . . . . .	332
Mungeli . . . . .	269	Barsi . . . . .	312
Gadarwara . . . . .	268	Hyderabad . . . . .	305
Harda . . . . .	261	Yeola . . . . .	302
Raipur . . . . .	254	Garhi Yasin . . . . .	301
Umrer . . . . .	249	Ahmedabad . . . . .	293
Damoh . . . . .	249	Dakore . . . . .	291
Itarsi . . . . .	249	Mehmedabad . . . . .	281
Bilaspur . . . . .	249	Viramgaon . . . . .	274
Saugor . . . . .	248	Surat . . . . .	269
Seoni-Malwa . . . . .	248	Nasik . . . . .	259
Khandwa . . . . .	246	Ilkal . . . . .	258
Hoshangabad . . . . .	245	Ratodro . . . . .	257
Nagpur . . . . .	244	Satara . . . . .	256
Talegaon . . . . .	244	Borsad . . . . .	255
Ramtek . . . . .	241	Poona Cantt. . . . .	248
Dhamtari . . . . .	240	Deolali Cantt. . . . .	244
Sihora . . . . .	235	Kotri . . . . .	241
Chhindwara . . . . .	230	Rohri . . . . .	240
Warud . . . . .	225	Larkana . . . . .	238
Anjangaon . . . . .	224	Shikarpur . . . . .	223
Khamgaon . . . . .	224	City of Bombay . . . . .	219
Bamora . . . . .	221	Baramati . . . . .	210
Akot . . . . .	221	Sholapur . . . . .	204
Chhota Chhindwara . . . . .	220		203
Mowar . . . . .	218	Kapadvanj . . . . .	202
Shegaon . . . . .	216	Tatta . . . . .	201
Warora . . . . .	215		
		<i>Madras Presidency.</i>	
Kalmeshwar . . . . .	214	Vizagapatam . . . . .	295
Mandia . . . . .	211	Tinnevely . . . . .	260
Wadegaon . . . . .	211	Periyakulam . . . . .	260

TABLE O.—INFANTILE DEATH RATES OF 200 AND OVER PER 1,000 LIVE-BIRTHS  
IN TOWNS.

<i>N.-W. F. Province.</i>		<i>United Provinces—contd.</i>	
Tank Notified Area . . . . .	251	Rae Bareli . . . . .	234
Nawanshahar Nd. Area . . . . .	209	Khurja . . . . .	232
Dera Ismail Khan . . . . .	208	Sambhal . . . . .	232
Haripur . . . . .	202		
<i>Delhi.</i>		Sandila . . . . .	232
Delhi Fort . . . . .	250	Bahraich . . . . .	232
Delhi City . . . . .	201	Nagina . . . . .	231
<i>United Provinces.</i>		Balrampur . . . . .	231
Mau (Jhansi) . . . . .		Shahabad . . . . .	231
Farrukhabad . . . . .	359	Muttra . . . . .	229
Etawah . . . . .	356		
Etah . . . . .	323	Moradabad . . . . .	227
Aonla . . . . .	321	Fatehpur . . . . .	227
Sitapur . . . . .	316	Kiratpur . . . . .	224
Jhansi . . . . .		Cawnpore . . . . .	224
Saharanpur . . . . .	305	Hapur . . . . .	223
Atrauli . . . . .		Allahabad . . . . .	222
Soron . . . . .	302		
Tilhar . . . . .	302	Bijnor . . . . .	219
Sahaswan . . . . .	294	Firozabad . . . . .	217
Kashipur . . . . .	292	Mallawan . . . . .	216
Bilaspur . . . . .	291		
Roorkee . . . . .	290	Nanpara . . . . .	216
Shikarpur . . . . .	286	Orai . . . . .	215
Rath . . . . .	286	Lakhimpur . . . . .	215
Hardwar Union . . . . .	285		
Jalesar . . . . .	284	Haldwani . . . . .	214
Sikandra Rao . . . . .	276	Debai . . . . .	213
Budaun . . . . .	275	Rudanli . . . . .	213
Hathras . . . . .	271	Lalipur . . . . .	212
Lucknow . . . . .	265	Najibabad . . . . .	211
Sikandrabad . . . . .	264	Muzaffarpur . . . . .	209
Fyzabad . . . . .	264		
Pilibhit . . . . .	260	Nairana . . . . .	
Ujhani . . . . .	258	Mainpuri . . . . .	208
Sultanpur . . . . .		Hasanpur . . . . .	208
Khairabad . . . . .	252		
Chandpur . . . . .	251	Deoband . . . . .	207
Chandausi . . . . .	250	Nawabganj . . . . .	207
Brindaban . . . . .	247		206
Dhampur . . . . .	245	Kanauj . . . . .	206
Dehra . . . . .	243	Amroha . . . . .	205
Bulandshahr . . . . .	240		204
Benares . . . . .	238	Aligarh . . . . .	204
Garhia Phatak . . . . .	238	Khandla . . . . .	203
Unao . . . . .	235		203
Mau (Azamgarh) . . . . .	234	Jauhpur . . . . .	200
		<i>Bengal Presidency.</i>	
		Kalna . . . . .	448
		Birnagar . . . . .	312
		Kumar Khali . . . . .	282
		Dainhat . . . . .	268
		Barisal . . . . .	258
			246

TABLE N.—DEATHS ACCORDING TO AGE IN URBAN AREAS.

	Under one year.		1-5 years.		5-10 years.		10-15 years.		15-20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	81,903	71,280	42,872	41,974	9,157	9,255	5,767	7,034	7,261	11,519
N.W. P.	743	617	512	488	199	132	104	107	104	117
Punjab	12,689	11,020	5,012	4,892	1,636	1,552	1,071	1,432	1,182	1,622
Delhi	1,814	1,612	954	1,004	220	196	112	168	158	287
U. P.	21,891	18,528	10,398	10,646	2,013	1,988	1,092	1,731	1,403	3,104
B. and O.	2,268	1,422	1,512	1,422	487	445	309	382	368	625
Bengal	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.
C. P.	8,664	7,157	4,336	4,183	691	767	438	595	610	1,127
Bombay	16,311	12,950	10,177	10,184	1,689	1,791	910	1,173	1,293	2,065
Madras	11,629	11,086	7,232	7,254	1,652	1,662	983	1,041	1,184	1,922
Coorg	12	10	10	9	10	10	12	7	23	13
Assam	407	327	156	139	82	80	60	50	81	101
Burma	5,111	4,126	1,444	1,472	472	602	389	394	582	628
Ajmer-Merwara	1,053	916	623	581	76	80	35	81	67	108
British India	17,996	23,895	18,713	16,592	19,167	12,512	13,994	12,756	37,543	35,737
N.W. P.	241	279	234	190	234	160	243	140	513	381
Punjab	1,992	2,398	2,007	2,074	2,402	2,030	2,834	2,200	4,913	4,316
Delhi	315	478	296	346	831	237	337	200	742	679
U. P.	3,323	6,135	8,018	8,521	3,959	2,621	8,085	2,419	8,698	8,116
B. and O.	863	1,040	834	655	311	405	394	532	1,218	1,222
Bengal	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.	Not available.
C. P.	1,959	2,612	1,915	1,143	1,321	848	1,826	880	3,223	2,972
Bombay	3,571	4,986	4,311	3,811	2,490	2,348	4,093	2,348	7,006	6,597
Madras	3,520	4,971	8,870	9,717	4,093	2,680	4,093	2,680	8,901	9,001
Coorg	00	32	64	25	47	11	22	5	18	8
Assam	393	321	274	187	199	90	177	79	223	149
Burma	2,331	1,383	1,941	1,387	1,941	932	1,401	947	1,742	1,988
Ajmer-Merwara	136	259	151	155	188	153	209	136	356	259



	Under one year.		1-5 years.		6-10 years.		10-15 years.		15-20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India . . .	500,155	490,220	395,899	384,915	106,013	94,572	61,307	52,893	67,094	72,664
N.W.F.P. . . . .	4,257	8,192	3,041	3,104	1,581	1,200	1,018	841	998	748
Punjab . . . . .	81,001	65,608	89,220	35,801	14,376	12,447	11,238	10,133	11,085	10,771
Orissa . . . . .	1,019	912	560	506	115	85	70	56	80	88
U. P. . . . .	128,393	104,315	102,280	87,695	21,659	17,876	14,533	11,061	15,093	18,672
B. and O. . . . .	87,379	71,940	68,000	70,649	24,256	20,555	13,307	10,438	13,854	13,461
Bengal . . . . .		Not available.					Not available.			
C. P. . . . .	49,538	56,613	40,823	35,034	8,554	7,726	4,371	3,947	5,091	6,037
Bombay . . . . .	57,431	44,332	44,535	10,469	10,887	10,887	5,791	5,900	5,014	6,027
Madras . . . . .	146,393	124,278	69,176	68,564	18,873	18,965	7,448	7,241	13,517	17,910
Coorg . . . . .	203	186	170	138	72	78	70	79	93	115
Assam . . . . .	19,991	16,591	11,221	11,139	5,962	5,189	2,357	2,415	2,713	4,139
Burma . . . . .		Not available.					Not available.			
Ajmer-Marwar . . . .	1,123	971	900	740	121	124	104	92	125	152
50-60 years.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India . . .	142,494	167,170	185,355	140,107	162,640	123,008	166,538	136,293	309,052	295,315
N.W.F.P. . . . .	1,881	1,842	2,254	2,214	2,219	1,804	2,068	1,540	3,085	1,954
Punjab . . . . .	16,748	16,693	17,263	16,773	18,980	15,940	20,768	17,553	41,108	33,893
Orissa . . . . .	135	186	165	171	137	140	182	133	293	233
U. P. . . . .	37,893	38,079	40,298	38,059	48,415	30,939	45,377	38,469	73,489	62,925
B. and O. . . . .	35,856	35,379	34,433	30,247	32,193	24,713	31,270	23,307	44,057	48,446
Bengal . . . . .		Not available.					Not available.			
C. P. . . . .	10,159	12,596	11,206	10,089	12,092	8,520	11,453	1,500	23,954	25,134
Bombay . . . . .	11,602	16,001	13,708	11,600	16,322	14,022	15,709	11,879	33,332	32,013
Madras . . . . .	25,075	36,478	28,738	29,719	31,243	24,072	32,535	25,680	82,775	88,771
Coorg . . . . .	203	203	211	175	176	127	123	104	115	115
Assam . . . . .	5,768	9,454	6,773	6,334	6,797	4,403	6,317	4,346	8,396	6,106
Burma . . . . .		Not available.					Not available.			
Marwar . . . . .	253	319	906	872	437	277				

TABLE L.—DEATH RATES ACCORDING TO AGE.

Province.	Under one year.		1-5 years.		5-10 years.		10-15 years.		15-20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Total	176.9	189.9	32.9	30.3	8.6	8.6	5.4	5.5	7.8	9.4
N.W.F.P.	129.9	128.6	26.4	23.8	9.2	9.5	6.9	7.6	9.4	8.8
Punjab	188.8	173.7	29.6	23.8	8.5	8.4	8.0	8.8	10.2	11.8
Delhi	194.5	187.2	43.3	44.4	8.4	8.3	4.7	7.0	5.4	12.5
U.P.	169.2	155.5	38.6	33.2	7.2	7.0	5.1	5.4	7.1	8.2
B. & O.	135.2	119.0	36.8	32.2	9.2	8.5	6.1	5.2	8.7	8.5
Bengal	184.8	172.4	23.7	22.7	10.7	10.8	6.8	6.5	9.5	13.3
C. P.	215.2	186.4	48.5	41.1	9.1	8.7	5.3	5.2	8.2	9.9
Madras	164.1	148.1	41.9	41.2	8.0	6.2	5.0	5.1	6.2	8.4
Coorg	193.6	171.8	27.7	26.7	6.6	6.7	5.0	5.1	7.1	8.9
	236.0	211.8	24.6	23.0	8.6	9.6	8.2	9.6	12.7	17.0
Assam	166.0	146.5	71.2	70.6	15.1	18.7	4.8	5.2	8.7	5.9
Burma	96.6	77.8	19.1	18.5	6.2	6.6	4.6	4.4	6.9	6.7
Almer-Merwara	209.4	204.3	45.9	39.4	6.4	6.3	4.0	5.0	6.3	9.9

Province.	20-30 years.		30-40 years.		40-50 years.		50-60 years.		60 years and upwards.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Total	8.8	10.3	11.6	12.0	17.0	14.5	28.4	24.7	76.7	72.4
N.W.F.P.	9.0	10.1	14.0	16.0	21.9	21.5	34.2	32.3	66.1	62.0
Punjab	8.2	10.0	11.6	14.0	18.1	19.4	30.4	33.7	66.8	74.8
Delhi	5.4	11.0	7.5	14.4	15.0	17.8	28.7	28.2	87.8	109.2
U.P.	9.0	10.5	11.7	11.9	18.0	14.9	32.7	26.4	85.0	72.6
B. & O.	10.4	10.5	12.9	11.3	17.7	17.3	29.7	23.5	66.6	58.0
Bengal	9.6	13.1	12.8	14.0	18.7	17.9	31.6	30.3	74.3	71.6
C. P.	10.3	8.2	11.4	10.5	17.0	13.8	28.1	23.0	63.5	76.8
Madras	7.2	10.6	9.9	11.0	17.0	14.8	31.4	23.9	65.9	85.9
Coorg	7.4	9.0	9.6	9.0	14.0	13.4	25.0	22.3	80.7	82.1
	13.4	19.3	16.3	19.3	23.8	23.2	32.8	31.5	63.1	49.9
Assam	17.4	25.2	16.3	14.0	12.1	8.8	11.7	7.9	64.6	47.2
Burma	7.6	8.1	10.6	11.7	14.4	12.2	19.4	17.0	51.8	50.1
Almer-Merwara	7.0	12.0	11.4	12.2	19.4	15.7	30.0	28.8	108.8	90.6

TABLE K.—DEATHS ACCORDING TO AGE.

	Under one year.		1—5 years.		6—10 years.		10—15 years.		15—20 years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
<b>British India</b>	831,814	605,613	591,672	493,762	157,483	142,560	91,275	80,629	98,693	118,494
N.-W. P.	5,005	3,809	4,154	3,002	1,690	1,422	1,122	943	1,070	805
Punjab	79,634	44,308	44,308	40,453	16,042	14,000	12,613	11,543	12,613	11,593
Delhi	2,883	2,024	1,514	1,510	885	281	163	224	218	369
U. P.	150,910	102,948	113,178	68,241	23,602	19,004	15,345	13,992	16,486	16,770
B. & O.	127,334	72,715	85,612	78,071	24,743	20,790	14,208	13,710	13,722	13,066
Bengal	89,007	55,570	71,049	70,580	82,047	34,333	21,295	18,116	21,702	31,290
C. P.	77,192	63,770	46,127	40,127	9,245	8,483	4,804	4,512	5,074	7,104
Romney	66,763	55,570	35,003	34,069	12,158	12,478	6,701	7,073	8,092	8,092
Burma	101,497	136,082	70,188	73,908	20,515	20,587	8,436	5,282	14,277	19,722
Coorg	532	438	177	177	82	88	82	86	116	128
Assam	29,398	16,618	11,377	11,978	6,044	5,278	2,917	2,465	2,794	4,290
Burma	38,719	28,263	12,605	12,743	4,735	4,902	3,295	3,043	4,033	4,030
Almora-Marwara	2,186	1,887	1,523	1,351	197	204	139	173	102	200
<b>British India</b>	213,977	261,657	230,705	213,743	234,330	174,450	233,059	183,431	423,444	401,894
N.-W. P.	2,192	2,121	2,488	2,404	2,453	1,954	2,800	1,686	3,578	2,315
Punjab	18,733	19,625	19,260	18,047	21,332	17,970	23,203	19,843	46,051	38,214
Delhi	450	604	461	617	463	377	519	338	1,085	912
U. P.	41,216	44,294	43,316	39,680	46,744	33,451	48,912	35,849	89,157	71,040
B. & O.	38,714	36,419	35,237	31,205	33,004	23,218	32,724	23,393	45,276	49,668
Bengal	45,907	62,607	49,566	43,351	45,821	33,840	41,649	33,312	61,648	57,907
C. P.	11,439	14,548	12,651	11,182	13,353	9,393	12,784	10,399	27,177	28,106
Romney	20,070	21,141	17,440	17,440	16,402	15,491	13,772	14,297	40,388	38,580
Burma	28,695	41,149	32,336	33,336	27,653	27,653	36,879	31,554	89,446	92,886
Coorg	268	205	275	260	223	188	145	109	135	121
Assam	9,705	9,705	7,047	6,471	6,890	4,553	6,944	4,425	8,019	6,345
Burma	8,741	9,251	9,680	9,680	8,643	6,532	7,531	6,417	16,033	16,033
Almora-Marwara	392	578	457	429	615	410	641	433	594	917

TABLE J.—DEATHS BY MONTHS IN URBAN AREAS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m. (1932, 1931.)
British India . . .	50,299	43,947	45,209	45,618	491,069	51,565	44,961	51,992	56,702	52,977	54,132	56,504	603,973	24.0 25.4
N.-W. P. . . .	693	452	403	403	380	395	406	419	479	393	534	650	5,610	17.6 17.3
Punjab . . . .	5,817	4,773	4,581	4,851	5,136	6,297	5,210	6,062	6,669	5,783	6,413	7,995	69,642	21.9 22.2
Delhi . . . .	671	640	703	724	899	1,491	758	789	963	840	889	1,115	10,472	23.4 23.7
U. P. . . . .	8,076	7,161	8,123	9,532	10,464	13,865	8,281	10,173	12,346	10,759	9,807	8,791	117,893	31.1 34.6
B. & O. . . .	1,890	1,238	1,277	1,326	1,497	1,730	1,766	1,987	1,719	1,662	1,446	1,637	13,475	13.0 14.9
Bengal . . . .	6,065	4,946	4,957	4,779	4,886	4,439	5,363	5,404	5,286	5,364	6,056	6,497	63,991	18.2 19.1
C. P. . . . .	3,414	3,079	3,187	3,532	3,783	3,471	2,371	3,395	4,335	4,567	4,138	3,916	44,833	29.6 34.3
Bombay . . . .	8,094	7,229	7,841	7,956	8,616	6,320	7,167	9,228	9,626	9,120	9,383	9,493	100,433	23.7 24.3
Madras . . . .	11,735	10,083	9,759	8,673	9,322	9,263	9,091	9,984	10,132	10,332	11,046	12,514	121,699	25.1 25.5
Coorg . . . .	49	32	41	30	32	30	38	35	31	33	30	35	431	43.3 46.6
Assam . . . .	296	211	210	203	261	291	320	340	306	310	300	237	3,340	17.1 16.3
Burma . . . .	3,666	3,960	3,639	3,133	3,411	3,026	3,424	3,308	3,193	3,433	3,545	3,629	40,644	23.8 23.0
Ajmer-Merwara . . .	423	433	453	464	607	359	316	423	553	426	540	598	5,635	31.6 34.6

TABLE H.—DEATH RATES PER MILE BY MONTHS.

Province.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
<b>Total</b>	23.6	21.0	19.4	19.8	19.7	20.9	19.1	20.3	23.0	22.8	24.4	25.2
N.W.P.	33.3	21.7	16.9	15.1	14.4	15.7	15.8	15.4	10.4	20.1	22.0	27.6
Punjab	27.9	24.2	22.5	21.5	21.8	23.0	19.1	20.3	26.6	27.2	27.7	28.6
Delhi	13.4	18.3	20.5	21.5	21.6	20.7	21.0	20.2	20.2	23.6	23.0	33.4
U. P.	23.8	21.6	21.1	20.8	22.0	27.7	21.4	22.3	23.4	22.2	21.8	19.9
B. & O.	12.8	13.1	17.6	18.6	20.2	21.3	20.0	19.7	23.0	20.6	21.0	21.9
Bengal	22.5	21.5	19.0	18.3	19.9	15.2	16.0	17.3	18.4	20.4	22.9	20.7
C. P.	28.3	21.7	21.7	23.1	24.5	25.1	18.5	24.3	35.1	35.2	35.0	31.0
Bomday	23.2	19.5	22.2	20.2	19.7	17.4	17.1	22.1	27.1	27.1	27.1	26.6
Madras	22.1	22.9	18.6	18.6	19.3	21.2	21.2	21.2	21.2	21.2	21.2	21.2
Coorg	21.7	20.1	23.0	23.1	20.6	27.6	21.6	23.2	20.6	22.1	21.8	23.3
Assam	18.4	17.7	14.5	15.9	18.6	20.3	20.5	19.5	19.1	18.8	20.8	20.7
Burma	18.1	15.3	14.6	14.0	14.0	14.5	18.4	17.6	17.9	20.1	20.4	21.6
Ajmer-Merwara	24.6	29.4	33.4	24.0	25.6	20.2	14.8	22.1	33.9	22.4	24.3	26.6

TABLE I.—DEATHS BY MONTHS IN RURAL AREAS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Rate p.m. 1882. 1881.
<b>British India</b>	485,814	403,207	396,277	389,771	383,684	408,951	390,986	410,366	451,355	485,560	484,508	516,594	5,905,563	121.5 24.8
N.W.P.	5,967	3,596	3,438	2,517	2,466	2,631	2,743	2,004	3,279	3,617	3,714	4,861	41,667	20.1 20.6
Punjab	50,831	40,864	41,087	37,253	39,127	88,768	35,609	35,120	45,594	49,376	47,955	50,017	509,740	20.4 26.5
Delhi	357	328	380	414	488	607	367	284	434	411	491	664	6,266	26.1 26.0
U. P.	85,628	75,854	78,268	85,065	70,840	95,938	70,312	70,782	70,930	53,476	76,710	73,753	958,397	21.3 26.3
B. & O.	60,670	53,453	55,272	56,684	63,449	61,757	62,843	60,943	60,925	64,746	66,762	60,076	757,470	20.7 27.1
Bengal	102,383	80,484	75,721	71,468	66,996	57,960	65,690	66,073	70,650	81,510	100,506	119,518	985,228	20.5 22.5
C. P.	28,349	25,905	25,700	24,293	38,823	28,797	21,409	38,956	40,337	48,287	38,938	37,968	373,144	96.6 95.6
Bomday	54,228	30,010	28,739	23,808	28,354	24,753	27,715	24,081	30,468	40,592	45,068	41,068	401,991	22.4 23.7
Madras	88,631	69,108	65,317	60,540	61,037	60,310	70,301	72,027	73,542	71,994	70,024	88,194	870,325	21.1 23.4
Coorg	252	294	278	250	337	340	262	287	245	269	262	290	3,396	22.1 22.3
Assam	12,920	11,093	9,864	10,291	12,949	13,065	19,649	12,934	12,932	19,498	13,969	13,740	146,951	19.8 18.7
Burma	14,910	11,369	11,314	11,624	11,745	11,836	12,177	14,746	12,576	17,177	1,662	18,496	148,770	21.6 27.9
Ajmer-Merwara	778	573	927	645	641	540	591	623	1,010	622	577	660	8,318	21.6 27.9

TABLE F.—DEATHS.

	Estimated population.	Area in sq. miles.	Density per sq. mile.	Deaths.			Death rate p. m.		
				M.	F.	Total.	M.	F.	Total.
<b>British India . . . . .</b>	<b>288,993,664</b>	<b>890,645</b>	<b>302</b>	<b>3,039,159</b>	<b>2,793,507</b>	<b>5,805,666</b>	<b>21.9</b>	<b>21.2</b>	<b>21.6</b>
<b>N.-W. P. . . . .</b>	<b>2,391,464</b>	<b>13,903</b>	<b>177</b>	<b>95,991</b>	<b>91,356</b>	<b>187,347</b>	<b>20.2</b>	<b>19.2</b>	<b>19.8</b>
<b>Punjab . . . . .</b>	<b>23,845,829</b>	<b>96,614</b>	<b>243</b>	<b>303,250</b>	<b>271,123</b>	<b>574,373</b>	<b>23.6</b>	<b>23.0</b>	<b>23.3</b>
<b>Delhi . . . . .</b>	<b>649,069</b>	<b>578</b>	<b>639</b>	<b>8,021</b>	<b>7,710</b>	<b>15,731</b>	<b>21.3</b>	<b>20.3</b>	<b>20.8</b>
<b>U. P. . . . .</b>	<b>48,884,400</b>	<b>100,248</b>	<b>456</b>	<b>581,125</b>	<b>495,100</b>	<b>1,076,225</b>	<b>22.6</b>	<b>21.3</b>	<b>22.0</b>
<b>B. &amp; O. . . . .</b>	<b>83,054</b>	<b>453</b>	<b>688</b>	<b>406,484</b>	<b>399,461</b>	<b>775,945</b>	<b>21.4</b>	<b>19.4</b>	<b>20.4</b>
<b>Bengal . . . . .</b>	<b>50,243,365</b>	<b>72,514</b>	<b>688</b>	<b>527,908</b>	<b>494,251</b>	<b>1,022,159</b>	<b>20.2</b>	<b>20.5</b>	<b>20.3</b>
<b>C. P. . . . .</b>	<b>15,710,927</b>	<b>99,920</b>	<b>155</b>	<b>219,978</b>	<b>197,600</b>	<b>418,577</b>	<b>27.0</b>	<b>25.2</b>	<b>26.6</b>
<b>Bombay . . . . .</b>	<b>22,156,220</b>	<b>123,690</b>	<b>176</b>	<b>259,874</b>	<b>240,414</b>	<b>500,288</b>	<b>23.3</b>	<b>21.7</b>	<b>22.5</b>
<b>Madras . . . . .</b>	<b>43,622,664</b>	<b>142,277</b>	<b>328</b>	<b>504,521</b>	<b>487,693</b>	<b>992,214</b>	<b>22.5</b>	<b>21.6</b>	<b>22.0</b>
<b>Coorg . . . . .</b>	<b>103,062</b>	<b>1,693</b>	<b>103</b>	<b>3,037</b>	<b>1,789</b>	<b>4,826</b>	<b>22.5</b>	<b>21.4</b>	<b>21.9</b>
<b>Assam . . . . .</b>	<b>8,021,964</b>	<b>31,382</b>	<b>253</b>	<b>78,593</b>	<b>71,728</b>	<b>150,321</b>	<b>18.6</b>	<b>18.9</b>	<b>18.7</b>
<b>Burma . . . . .</b>	<b>12,232,937</b>	<b>116,616</b>	<b>104</b>	<b>109,573</b>	<b>99,847</b>	<b>209,420</b>	<b>17.5</b>	<b>16.7</b>	<b>17.1</b>
<b>Ajmer-Merwara . . . . .</b>	<b>503,420</b>	<b>2,711</b>	<b>207</b>	<b>7,336</b>	<b>6,612</b>	<b>13,948</b>	<b>24.6</b>	<b>24.9</b>	<b>24.8</b>

TABLE G.—DEATHS BY MONTHS.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
<b>British India . . . . .</b>	<b>530,113</b>	<b>440,854</b>	<b>441,586</b>	<b>435,337</b>	<b>447,853</b>	<b>490,516</b>	<b>435,947</b>	<b>462,338</b>	<b>508,057</b>	<b>513,627</b>	<b>533,640</b>	<b>573,698</b>	<b>5,805,666</b>
<b>N.-W. P. . . . .</b>	<b>6,000</b>	<b>4,048</b>	<b>3,886</b>	<b>2,920</b>	<b>3,875</b>	<b>3,029</b>	<b>3,140</b>	<b>3,083</b>	<b>3,758</b>	<b>4,010</b>	<b>4,948</b>	<b>5,511</b>	<b>47,177</b>
<b>Punjab . . . . .</b>	<b>56,648</b>	<b>45,737</b>	<b>45,068</b>	<b>42,104</b>	<b>44,313</b>	<b>45,005</b>	<b>38,819</b>	<b>41,191</b>	<b>52,293</b>	<b>55,159</b>	<b>54,373</b>	<b>58,012</b>	<b>570,882</b>
<b>Delhi . . . . .</b>	<b>1,023</b>	<b>968</b>	<b>1,098</b>	<b>1,133</b>	<b>1,377</b>	<b>2,168</b>	<b>1,116</b>	<b>1,073</b>	<b>1,392</b>	<b>1,251</b>	<b>1,380</b>	<b>1,709</b>	<b>15,737</b>
<b>U. P. . . . .</b>	<b>63,704</b>	<b>83,015</b>	<b>86,391</b>	<b>92,588</b>	<b>90,304</b>	<b>100,893</b>	<b>87,543</b>	<b>89,995</b>	<b>92,776</b>	<b>91,135</b>	<b>86,517</b>	<b>91,544</b>	<b>1,076,225</b>
<b>B. &amp; O. . . . .</b>	<b>106,448</b>	<b>85,400</b>	<b>86,708</b>	<b>58,910</b>	<b>64,940</b>	<b>60,487</b>	<b>61,009</b>	<b>71,780</b>	<b>71,644</b>	<b>66,308</b>	<b>68,168</b>	<b>70,663</b>	<b>775,945</b>
<b>Bengal . . . . .</b>	<b>503,420</b>	<b>440,854</b>	<b>441,586</b>	<b>435,337</b>	<b>447,853</b>	<b>490,516</b>	<b>435,947</b>	<b>462,338</b>	<b>508,057</b>	<b>513,627</b>	<b>533,640</b>	<b>573,698</b>	<b>5,805,666</b>
<b>C. P. . . . .</b>	<b>31,793</b>	<b>28,084</b>	<b>23,887</b>	<b>29,798</b>	<b>32,011</b>	<b>32,268</b>	<b>24,084</b>	<b>32,271</b>	<b>45,292</b>	<b>48,584</b>	<b>49,536</b>	<b>41,184</b>	<b>418,577</b>
<b>Bombay . . . . .</b>	<b>45,932</b>	<b>37,239</b>	<b>30,577</b>	<b>33,764</b>	<b>31,578</b>	<b>31,882</b>	<b>43,300</b>	<b>49,294</b>	<b>43,922</b>	<b>49,451</b>	<b>50,451</b>	<b>50,451</b>	<b>592,474</b>
<b>Madras . . . . .</b>	<b>100,266</b>	<b>70,196</b>	<b>76,306</b>	<b>60,218</b>	<b>79,959</b>	<b>78,578</b>	<b>73,392</b>	<b>82,611</b>	<b>83,064</b>	<b>82,320</b>	<b>87,070</b>	<b>100,408</b>	<b>992,624</b>
<b>Coorg . . . . .</b>	<b>301</b>	<b>326</b>	<b>319</b>	<b>310</b>	<b>300</b>	<b>370</b>	<b>300</b>	<b>322</b>	<b>270</b>	<b>307</b>	<b>262</b>	<b>325</b>	<b>3,817</b>
<b>Assam . . . . .</b>	<b>19,538</b>	<b>11,947</b>	<b>9,874</b>	<b>10,499</b>	<b>12,610</b>	<b>13,566</b>	<b>13,900</b>	<b>13,234</b>	<b>12,638</b>	<b>12,893</b>	<b>13,009</b>	<b>14,036</b>	<b>150,321</b>
<b>Burma . . . . .</b>	<b>15,570</b>	<b>14,662</b>	<b>14,963</b>	<b>11,772</b>	<b>14,762</b>	<b>15,570</b>	<b>15,570</b>	<b>15,570</b>	<b>17,772</b>	<b>20,690</b>	<b>20,207</b>	<b>22,116</b>	<b>200,420</b>
<b>Ajmer-Merwara . . . . .</b>	<b>1,201</b>	<b>1,311</b>	<b>1,380</b>	<b>1,100</b>	<b>1,248</b>	<b>829</b>	<b>707</b>	<b>1,001</b>	<b>1,063</b>	<b>1,078</b>	<b>1,117</b>	<b>1,254</b>	<b>13,948</b>

TABLE I).—BIRTHS.

	Births.		Total.	Birth rate p. m.		Total.	Males born to every 1,000 females.	Excess of birth rate over death rate.
	M.	F.		M.	F.			
British India . . . . .	4,702,913	4,351,583	9,054,506	35.9	33.4	25.7	108	12.1
N.-W. F. P. . . . .	38,620	29,626	68,146	26.9	26.8	25.5	130	8.7
Punjab . . . . .	512,408	457,228	970,226	38.3	45.0	40.5	112	10.3
Delhi . . . . .	14,568	13,453	28,061	38.7	40.2	43.2	108	19.0
U. P. . . . .	888,045	790,027	1,678,072	34.6	34.1	33.4	112	12.3
B. & O. . . . .	650,760	621,330	1,272,290	34.3	33.4	33.4	105	13.0
Bengal . . . . .	691,737	636,397	1,328,354	26.5	26.4	26.4	108	6.1
G. P. . . . .	842,114	709,972	1,552,086	45.6	48.6	44.6	105	18.1
Bombay . . . . .	406,047	376,970	783,017	34.9	35.7	35.3	108	12.6
Madras . . . . .	894,153	793,228	1,687,381	35.4	34.1	35.5	105	13.8
Coorg . . . . .	2,254	2,003	4,322	24.9	28.3	29.4	109	3.1
Assam . . . . .	192,845	115,574	308,419	99.0	90.5	90.7	106	11.0
Burma . . . . .	171,479	164,407	335,886	27.4	27.4	27.4	104	10.4
Imur-Murwarra . . . . .	10,489	9,285	19,774	35.0	34.8	34.8	113	10.1

TABLE E.—TOTAL BIRTHS BY MONTHS.

[illegible]

TABLE C.—ESTIMATED POPULATION BY SEX AND AGE.

	N. W. P. P.		Punjab.		Dohul.		U. P.		B. & O.		Bengal.		C. P.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	88,174	96,480	440,513	441,735	10,329	10,187	764,560	760,782	408,079	472,705	832,803	835,688	271,061	277,095
2-5 years	157,145	154,071	1,494,462	1,427,890	34,974	34,083	2,032,327	2,008,989	2,294,548	2,425,545	3,022,927	3,110,526	900,862	975,289
6-10 years	183,109	150,004	1,724,735	1,484,106	40,086	33,806	3,275,908	2,825,776	2,066,623	2,455,218	3,571,692	3,170,320	1,010,443	974,053
10-15 years	168,489	124,000	1,602,501	1,307,383	40,419	32,079	3,085,982	2,476,769	2,352,998	2,004,893	3,125,029	2,702,348	914,407	893,700
16-20 years	113,377	97,766	1,327,202	1,006,395	40,444	29,618	2,824,507	2,084,030	1,577,966	1,037,562	2,287,536	2,550,407	602,087	725,107
20-30 years	221,759	210,846	2,277,447	1,601,672	88,070	55,575	4,680,134	4,231,696	3,247,074	3,457,459	4,782,238	4,768,401	1,393,425	1,418,657
30-40 years	177,083	150,113	1,710,585	1,385,939	61,239	35,904	3,714,511	3,318,384	2,738,899	2,705,512	3,866,847	3,006,988	1,068,780	1,008,885
40-50 years	112,154	90,845	1,176,614	925,332	35,888	21,223	2,659,907	2,250,324	1,881,769	1,830,176	2,444,229	1,899,590	783,744	738,153
50-60 years	67,422	52,151	776,248	583,340	13,111	11,084	1,491,577	1,306,920	1,079,846	1,111,186	1,304,534	1,114,568	463,878	449,126
60 & above	54,126	37,312	689,619	510,863	11,722	8,322	960,550	978,683	690,260	856,801	870,490	706,614	313,058	1308,622
	Bombay.		Madras.		Coorg.		Assam.		Burma.		Ajmer-Merwara.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year	228,207	330,004	668,217	673,253	2,129	2,183	139,789	106,720	157,905	167,272	9,393	9,429	4,114,209	4,125,228
1-5 years	1,314,941	1,327,951	2,765,017	2,645,768	7,548	7,694	213,800	150,706	663,085	689,047	88,218	39,552	15,892,454	16,152,490
6-10 years	1,610,896	1,354,276	3,112,341	3,053,470	9,536	9,120	400,959	281,947	708,517	762,169	36,641	32,315	13,905,995	16,476,580
10-15 years	1,352,346	1,148,333	2,831,506	2,709,807	10,002	8,962	682,564	477,977	713,475	688,280	84,624	29,291	16,790,332	14,738,092
16-20 years	1,018,126	964,508	2,262,474	2,222,224	9,137	7,530	751,795	729,409	581,283	601,068	29,764	26,262	12,716,757	12,433,832
20-30 years	2,142,655	1,983,742	3,980,294	4,560,163	19,637	15,292	349,112	335,874	1,152,109	1,108,412	55,621	43,198	24,290,576	24,170,867
30-40 years	1,809,070	1,450,504	3,392,805	3,372,088	16,354	10,348	482,870	432,570	915,948	770,464	40,170	35,070	19,972,010	17,847,025
40-50 years	1,140,241	946,254	2,966,779	2,282,782	9,887	5,944	572,418	517,064	600,955	535,611	31,751	24,151	13,754,328	12,017,104
50-60 years	680,233	564,141	1,425,232	1,413,523	4,422	3,453	547,529	566,506	391,768	376,007	17,789	16,054	8,208,074	7,620,326
& above	408,253	402,441	1,084,528	1,130,093	2,506	2,425	133,478	134,320	317,317	311,900	9,050	10,124	5,551,027	5,545,498



TABLE D.—POPULATION (UNDER REGISTRATION) ACCORDING TO 1931 CENSUS COMPARED WITH ESTIMATED POPULATION  
ON 30TH JUNE, 1932.

	Rural		Urban		Total		Male		Female	
	Census.	Estimated.	Census.	Estimated.	Census.	Estimated.	Census.	Estimated.	Census.	Estimated.
British India	239,520,630	242,457,008	26,159,769	26,466,563	265,716,405	268,923,564	138,896,172	138,582,828	126,820,233	130,300,736
N.-W. F. P.	2,043,537	2,072,204	315,174	319,260	2,358,711	2,391,464	1,208,513	1,257,757	1,090,108	1,103,077
Punjab	20,337,838	20,766,531	3,132,329	3,178,408	23,460,267	23,945,929	12,708,121	13,020,908	10,662,140	10,894,121
Delhi	107,066	201,657	439,180	447,442	536,246	649,099	369,407	376,532	266,749	272,747
U. P.	44,065,155	45,077,820	3,749,603	3,756,580	48,408,738	48,864,400	25,445,006	25,677,535	22,963,737	23,187,065
B. & O.	88,265,937	86,619,114	1,401,422	1,420,701	87,667,359	88,039,805	18,794,138	18,962,687	18,888,438	19,077,218
Bengal	46,839,495	46,727,148	3,511,536	3,516,512	49,901,080	50,243,555	25,627,428	26,107,516	23,073,652	24,135,439
C. P.	13,844,061	14,025,109	1,663,662	1,684,918	15,507,723	15,710,027	7,761,818	7,857,649	7,745,905	7,852,373
Bombay	17,606,704	17,918,365	4,203,032	4,237,864	21,806,766	22,156,229	11,465,782	11,640,854	10,349,974	10,515,375
Madras	39,217,873	39,842,777	5,986,672	6,079,587	45,204,545	45,922,364	22,317,201	22,683,906	22,887,344	23,233,759
Coorg	163,500	153,943	9,827	9,719	163,327	163,662	90,575	90,659	72,762	73,003
Assam	7,733,479	7,820,193	193,350	195,771	7,926,829	8,021,964	4,186,383	4,232,570	3,740,446	3,789,394
Burma	10,692,798	10,841,732	1,409,492	1,410,905	12,102,290	12,252,637	6,182,629	6,216,529	5,010,661	5,098,108
Alm-Merina	380,093	384,439	180,199	179,009	560,292	563,429				

TABLE A.—MAXIMUM, MINIMUM, MEAN TEMPERATURE AND DEPARTURE FROM THE AVERAGE OF THE MEAN TEMPERATURE AT 31 STATIONS, AND RAINFALL WITH ITS DEPARTURE AT 33 STATIONS IN INDIA DURING 1932—*concl.*

Station.	October.					November.					December.							
	Max.	Min.	Mean temp.	Rain.	Dep.	Max.	Min.	Mean temp.	Rain.	Dep.	Max.	Min.	Mean temp.	Rain.	Dep.			
Rangoon	88.8	76.8	82.8	+1.1	9.66	+2.75	90.4	75.0	82.7	+2.6	0.08	+0.81	88.8	67.7	78.3	+1.0	0.39	+0.02
Akyab	87.9	77.6	82.7	+1.0	3.61	-7.80	89.6	72.1	79.3	+1.5	2.71	-2.77	81.7	61.5	71.0	-0.3	—	-0.76
Singapur	86.2	70.9	78.5	+1.2	6.07	+0.97	80.4	63.9	72.1	+3.5	2.49	+1.39	74.1	54.4	64.3	+3.3	2.37	+1.85
Sitabgarh	89.7	72.0	81.3	+0.9	10.48	+3.93	85.1	66.9	76.0	+1.7	3.83	+2.23	79.0	55.2	67.5	+0.4	0.02	-0.87
Chitradong	86.4	75.2	80.8	+2.8	0.98	-5.90	85.9	68.0	77.5	+3.1	12.03	+10.76	81.4	58.1	69.7	+1.9	—	-0.70
Karimganj	90.2	76.6	83.4	+1.8	4.15	-0.22	85.8	68.9	77.3	+2.5	2.40	+1.42	80.9	58.6	70.2	+2.7	—	-0.19
Calcutta	90.0	76.4	83.2	+2.3	3.79	-0.40	81.7	67.6	74.7	+2.4	8.89	+8.23	78.6	58.9	68.7	+2.8	—	-0.20
Cuttack	92.0	76.5	84.7	+1.5	1.58	-3.92	84.6	68.3	76.5	+0.9	6.98	+4.45	83.8	58.2	71.3	+1.4	—	-0.28
Rizabad	85.0	65.6	75.3	..	1.35	-1.77	75.3	58.6	66.9	..	3.14	+2.77	73.3	47.2	60.3	..	0.11	-0.10
Patna	81.2	72.7	81.9	+1.3	1.20	-1.34	81.8	62.9	72.3	+1.0	2.50	+2.22	76.1	52.7	64.4	+1.5	0.40	+0.31
Patna	82.0	77.7	80.3	+1.1	1.29	-1.03	82.7	58.2	69.5	+0.1	0.26	-0.07	76.7	47.4	62.1	+0.3	—	-0.23
Lucknow	84.9	69.5	80.7	+1.9	1.30	+0.82	83.6	55.4	69.5	+0.9	1.12	+0.93	76.8	47.3	62.1	+1.0	—	-0.28
Jhansi	91.4	69.7	80.5	-0.8	..	-0.87	85.5	53.1	68.7	-3.3	..	-0.17	79.6	47.5	63.5	-1.1	—	-0.23
Agra	94.7	61.9	83.3	+0.5	..	-0.76	83.9	47.6	65.7	-1.7	..	-0.12	74.9	42.6	58.7	-1.9	—	-0.27
Meerut	..	..	..	..	..	-0.56	..	..	..	..	..	-0.15	..	..	..	..	0.74	+0.33
Delhi	85.6	64.0	74.8	..	..	-0.32	82.8	51.4	67.1	..	-0.11	..	73.1	44.1	58.6	..	—	-0.40
Lahore	94.2	61.1	77.7	..	..	-0.25	83.8	46.1	64.9	-0.9	..	-0.07	70.6	40.2	55.4	-1.3	1.53	+1.17
Multan	97.4	65.4	81.4	+0.7	..	-0.05	87.1	51.6	69.3	+0.3	..	-0.07	74.1	44.5	59.3	+0.1	0.01	-0.21
Peshawar	90.1	69.5	79.3	+1.2	..	-0.16	81.8	48.2	65.0	+2.3	..	-0.28	70.0	38.7	54.3	+0.8	0.49	-0.10
Karachi	89.8	74.0	81.9	+1.5	..	-0.01	84.9	65.9	74.0	-0.7	..	-0.04	79.2	60.5	69.9	+1.0	—	-0.14
Alexandria	89.8	64.3	77.3	+1.1	..	-0.33	84.7	43.7	66.7	-1.5	..	-0.13	77.1	40.6	61.9	+0.8	—	-0.28
Dacca	90.8	68.5	80.0	+1.7	0.07	-0.34	94.7	54.7	74.7	-0.4	..	-0.10	89.1	51.0	70.1	+1.0	—	-0.64
Madras	88.5	66.5	77.5	+1.1	..	-0.27	83.5	53.2	68.0	-1.4	..	-0.41	81.3	49.6	65.5	+0.6	—	-0.21
Saugor	88.6	68.0	78.3	+0.9	0.90	-0.12	81.2	58.8	70.0	-0.2	..	-0.40	78.6	54.9	66.7	+1.9	—	-0.41
Tripunpore	88.0	65.0	77.4	+1.5	0.51	-1.30	82.0	53.2	67.1	-0.5	..	-0.07	80.2	45.4	62.8	+0.9	—	-0.29
Nagpur	92.7	69.6	81.1	+1.7	0.07	-1.39	86.1	62.5	74.3	-1.6	1.03	-0.82	85.1	62.5	74.3	+0.9	—	-0.64
Bombay	90.8	73.1	84.2	+2.1	9.01	+6.35	90.4	74.1	82.3	+1.5	0.07	-0.34	87.5	60.1	78.8	+1.3	—	-0.03
Belgaum	88.5	66.8	77.1	+0.9	16.31	+12.14	81.7	68.2	75.5	+0.5	2.33	+0.64	82.8	57.9	70.3	+0.3	—	-0.37
Bangalore	85.4	63.7	74.5	-0.6	13.20	+7.96	80.2	64.5	72.3	+1.3	4.00	+1.12	79.9	59.4	69.7	+0.9	0.26	-0.22
Madras	87.9	70.2	81.5	-0.5	21.03	+9.91	84.3	73.7	79.0	+0.2	11.52	-2.73	82.9	60.5	73.2	-0.4	0.92	-2.74
Bellary	88.3	72.5	80.4	-0.4	6.40	+2.70	85.0	69.3	77.1	-0.3	8.72	+1.63	84.8	62.5	73.7	-0.1	0.17	+0.07
Dindigul	91.7	51.1	58.3	+0.5	1.05	-8.49	88.4	46.2	53.3	+2.1	4.06	+4.13	83.2	38.3	44.3	+1.2	1.31	+0.07
Mysore	65.1	52.4	58.7	+0.6	0.70	..	60.5	47.1	53.8	+2.1	1.08	..	59.1	49.1	49.9	+0.9	0.12	+0.26



TABLE A.—MAXIMUM, MINIMUM, MEAN TEMPERATURE AND DEPARTURE FROM THE AVERAGE OF THE MEAN TEMPERATURE AT 31 STATIONS, AND RAINFALL WITH ITS DEPARTURE AT 33 STATIONS IN INDIA DURING 1932—*contd.*

Station.	April.				May.				June.			
	Max.	Min.	Mean temp.	Rain. Dep.	Max.	Min.	Mean temp.	Rain. Dep.	Max.	Min.	Mean temp.	Rain. Dep.
Bangalore	85.8	76.6	81.2	-0.9	94.6	77.7	86.1	+1.7	86.4	76.6	81.5	+0.1
Alwar	89.9	76.1	83.0	-0.9	80.2	77.7	83.9	-0.1	85.3	75.1	81.7	-0.1
Silchar	86.9	66.4	76.7	+3.1	88.8	70.9	77.4	-1.1	88.8	70.4	82.6	+0.2
Silchar	90.0	68.0	79.0	+0.7	89.5	73.3	81.4	+0.7	90.1	76.3	83.2	+0.5
Chittagong	90.2	73.0	81.6	+0.8	89.5	76.5	83.0	+0.9	87.5	77.5	82.5	+0.7
Surayanganj	93.7	73.1	83.4	+0.4	89.5	77.0	84.3	+0.8	90.5	79.4	84.9	+1.5
Calcutta	98.4	76.5	87.5	+1.9	94.8	79.3	87.1	+0.0	91.4	80.8	86.0	+0.8
Cuttack	101.2	76.4	88.8	-0.7	100.2	79.9	90.1	-0.5	97.4	80.0	88.7	+1.2
Hazratnagar	..	..	..	..	..	..	..	..	..	..	..	..
Patna	100.9	75.6	87.3	+1.1	104.8	78.5	91.7	+2.9	99.0	82.4	91.1	+3.4
Amritsar	103.3	76.6	89.9	-0.1	108.4	78.8	93.6	+0.5	106.6	88.9	96.3	+3.9
Lucknow	103.3	76.6	89.9	-0.1	106.5	78.1	92.3	+1.1	106.1	88.2	95.7	+4.1
Jhansi	101.9	73.8	87.3	-2.2	108.4	81.0	94.7	-1.3	107.5	87.0	97.7	+3.5
Meerut	100.2	73.8	87.0	-1.3	105.7	76.2	90.9	-1.3	107.8	86.5	97.1	+2.7
Delhi	97.4	70.6	84.0	0.25	102.5	76.1	89.3	..	..	..	..	..
Lehore	97.4	65.5	81.5	+1.3	102.5	76.1	89.3	..	105.6	88.7	95.6	0.84
Multan	100.9	70.8	85.9	+2.9	105.0	77.0	91.5	-1.0	109.0	88.4	96.7	+1.9
Peshawar	101.4	72.9	87.1	+4.6	108.9	78.5	93.7	+1.7	111.6	88.6	96.6	+2.1
Amritsar	103.3	76.6	89.9	-0.1	106.5	78.1	92.3	+1.1	106.1	88.2	95.7	+4.1
Alwar	89.9	76.1	83.0	-0.9	80.2	77.7	83.9	-0.1	85.3	75.1	81.7	-0.1
Doosa.	108.8	70.7	87.3	-0.2	110.8	79.2	95.0	+2.8	107.4	81.2	94.3	+3.3
Indore	90.9	69.4	83.1	-1.7	103.7	77.5	90.6	+1.1	89.4	81.7	85.5	-1.1
Saugor	98.0	72.8	85.4	-1.3	105.3	78.5	90.9	-0.6	108.5	82.6	93.9	+2.8
Tombhore	100.4	69.9	85.1	-0.8	104.6	77.5	92.1	+0.2	108.4	81.8	92.8	+1.0
Nagpur	103.7	72.9	89.3	-0.3	107.7	76.4	92.1	-0.58	106.7	76.4	92.1	-0.58
Bombay	88.4	77.4	83.4	+1.3	100.2	80.5	90.8	+2.1	100.2	80.5	90.8	+2.1
Belgaum	95.1	67.8	81.2	-0.3	101.2	78.4	92.3	+0.8	101.2	81.0	91.1	+2.7
Bengalore	85.8	76.6	81.2	-0.9	94.6	77.7	86.1	+1.7	86.4	76.6	81.5	+0.1
Madras	92.1	76.5	84.3	-0.58	102.1	81.0	91.9	+2.0	102.1	81.0	91.9	+2.0
Bellary	100.8	77.7	89.0	-1.4	99.0	78.0	88.0	-1.0	82.5	67.6	75.1	+0.3
Darjeling	62.5	45.4	65.9	-0.6	63.7	55.5	58.6	+0.1	86.0	67.0	76.5	+0.6
Mussorie	69.5	58.9	61.5	-0.7	77.6	57.0	66.0	-2.0	90.4	82.0	90.7	+1.3

\* Reports only rainfall.

† Mean of 20 days.

‡ Mean of 30 days.

TABLE A.—MAXIMUM, MINIMUM, MEAN TEMPERATURE AND DEPARTURE FROM THE AVERAGE OF THE MEAN TEMPERATURE AT 31 STATIONS, AND RAINFALL WITH ITS DEPARTURE AT 33 STATIONS IN INDIA DURING 1932.

Station.	January.				February.				March.					
	Max.	Min.	Mean temp.	Dep.	Max.	Min.	Mean temp.	Dep.	Max.	Min.	Mean temp.	Dep.		
Bangpoo	.	.	89.0	65.3	77.7	+0.0	—	-0.21	84.4	68.3	73.1	-0.3	0.11	-0.11
Ayrah	.	.	81.3	58.2	69.7	-0.3	—	-0.06	82.5	67.6	72.0	-0.5	-0.49	—
Shigar	.	.	72.7	51.7	62.2	+2.8	1.5	+0.80	73.1	52.6	62.9	-0.1	2.64	+0.13
Bihar	.	.	79.4	59.9	69.1	+0.9	0.00	-0.75	79.5	54.7	66.6	-0.5	8.07	+0.95
Chattisgarh	.	.	81.3	56.4	68.6	+1.8	—	-0.28	81.2	58.3	69.7	-0.7	2.47	+1.64
Narayanganj	.	.	80.3	57.2	69.0	+2.5	0.03	-0.27	81.1	58.8	70.2	-0.2	2.12	+0.72
Calcutta	.	.	80.9	59.9	69.9	+3.3	—	-0.34	83.3	60.0	72.1	+0.8	0.25	-0.85
Guwahati	.	.	86.0	59.5	72.7	+1.1	—	-0.27	87.6	62.4	75.0	-2.0	0.58	-0.18
Hazratnagar*	.	.	..	..	..	..	..	-0.72	..	..	..	..	1.24	+0.11
Patra	.	.	77.3	52.9	65.8	+3.5	—	-0.53	79.5	54.4	66.9	+1.1	0.39	-0.32
Alakhad	.	.	78.4	49.3	64.0	+3.7	—	-0.70	81.2	49.1	65.1	-0.5	0.23	-0.36
Lucknow	.	.	78.3	49.4	63.9	+3.5	—	-0.77	79.2	50.7	64.9	+0.3	0.07	-0.58
Jhansi	.	.	85.8	50.8	67.3	+3.8	—	-0.69	81.3	51.9	68.9	-1.1	0.11	-0.34
Agre.	.	.	79.0	47.2	63.1	+4.1	—	-0.54	79.1	44.9	62.0	-0.7	0.11	-0.77
Meerut*	.	.	..	..	..	..	..	-1.23	..	..	..	..	..	..
Dahli	.	.	77.7	43.0	60.3	—	—	-1.04	78.7	44.0	60.3	+0.5	0.05	-0.70
Lahore	.	.	70.9	43.3	57.1	+2.1	1.34	+0.29	73.5	44.5	59.0	+0.5	0.43	-0.31
Multan	.	.	74.0	49.9	60.5	+3.0	0.23	+0.14	77.0	43.5	62.7	+1.3	—	-0.38
Peshawar	.	.	76.8	45.3	59.7	+2.1	1.84	+0.29	69.2	43.3	59.3	+1.3	0.45	-0.40
Karachi	.	.	76.8	49.0	62.1	+1.1	0.21	-0.31	73.4	43.0	70.7	-1.3	-0.39	-0.39
Ajmer	.	.	79.3	49.0	64.4	+4.7	—	-0.36	77.7	43.3	60.0	-0.5	0.12	-0.13
Deesa	.	.	80.8	52.3	71.3	+3.9	—	-0.11	87.4	59.4	68.1	-2.5	—	-0.16
Indore	.	.	82.5	51.8	67.1	+3.3	—	-0.23	80.0	59.1	65.1	-0.9	—	-0.13
Saugor	.	.	81.9	56.9	69.4	+4.7	—	-0.36	79.1	54.4	66.7	-1.3	0.84	+0.40
Punjab	.	.	83.0	50.3	65.7	+3.9	—	-0.80	80.8	59.5	65.7	-1.3	0.71	-0.11
Rampur	.	.	80.0	54.9	70.5	+4.0	—	-0.42	85.4	57.2	71.3	-2.7	1.40	+0.80
Bombay	.	.	83.2	60.2	73.7	+3.9	—	-0.10	84.7	69.3	77.0	+1.9	—	-0.03
Belgaum	.	.	82.9	58.0	70.5	-0.2	—	-0.13	86.9	56.1	71.5	-2.3	—	-0.05
Bengalore	.	.	83.1	55.9	69.5	-0.7	—	-0.26	86.0	61.5	73.7	+0.5	3.54	+3.37
Madras	.	.	83.4	67.6	75.5	-0.7	—	-1.39	86.3	69.4	77.9	+0.1	0.69	+0.37
Bellary	.	.	85.1	60.4	72.7	-3.2	—	-0.11	90.9	67.2	79.1	-1.1	—	-0.16
Darjeeling	.	.	43.1	29.7	41.7	+0.6	0.33	-0.22	45.2	33.3	39.7	-2.7	0.47	-0.43
Massoree	.	.	53.6	41.7	+4.9	0.13	..	..	50.0	33.3	44.1	+0.3	1.79	..

\* Reports only rainfall.

† Mean and total of 30 years.

\* Reports only rainfall.

† Mean and total of 30 days.

Appendix I.  
relating to  
Section I.

## APPENDIX IV.—RELATING TO SECTION VI ON VACCINATION AGAINST SMALLPOX.

TABLE	PAGE.
A. Vaccination Statistics relating to British India for 1932-33 . . . . .	382
B. Vaccinations performed in the British and Indian Armies during 1932 :—	
(i) Officers and other Ranks . . . . .	383
(ii) Families (British Army) . . . . .	383
(iii) Families (Indian Army). . . . .	383

## APPENDIX V.—RELATING TO SECTION VIII ON LABORATORIES AND MEDICAL RESEARCH.

List of scientific papers on research written by the research workers under the Government of India, the I. R. F. A. and Provincial Governments and published during the year 1932—

A.—(i) Papers published in the I. J. M. R. and its memoirs . . . . .	386
(ii) Papers published in the Records of the Malaria Survey of India . . . . .	390
B.—Papers published in the I. M. G. . . . .	391
C.—Papers published in other journals . . . . .	396

## APPENDIX VI.—RELATING TO SECTION X :—PRISONERS.

A. Sickness and mortality amongst prisoners by administration . . . . .	400
B. Sickness and mortality amongst prisoners by groups . . . . .	402
C. Causes of admission to hospital by months . . . . .	404
D. Sickness and mortality from principal diseases for the decennium 1923-32 . . . . .	405
E. Sickness statistics of convicts . . . . .	406
F. Sickness statistics of convicts arranged according to duration of confinement . . . . .	407
G. Admission and death rates . . . . .	408
H. Admissions from enteric fever, malaria, pyrexia of uncertain origin, cholera, dysentery and diarrhoea by months . . . . .	409
I. Details of diseases . . . . .	411

## APPENDICES.

## APPENDIX I.—RELATING TO SECTION I ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA.

TABLE	PAGE.
A. Maximum, minimum, mean temperature and departure from the average of the mean temperature at 31 stations, and rainfall with its departure at 33 stations in India during 1932. . . . .	340
B. Population (under registration) according to 1931 census compared with estimated population on 30th June, 1932. . . . .	344
C. Estimated population by sex and age . . . . .	345
D. Births . . . . .	346
E. Births by months . . . . .	346
F. Deaths . . . . .	347
G. Deaths by months . . . . .	347
H. Death rates <i>per mille</i> by months . . . . .	348
I. Deaths by months in rural areas . . . . .	348
J. Deaths by months in urban areas . . . . .	349
K. Deaths according to age . . . . .	350
L. Death rates <i>per mille</i> according to age . . . . .	351
M. Deaths according to age in rural areas . . . . .	352
N. Deaths according to age in urban areas . . . . .	353
O. Infantile death rates of 200 and over per 1,000 live-births . . . . .	354

## APPENDIX II.—RELATING TO SECTION II :—CHIEF DISEASES.

A. Deaths from cholera from 1901 to 1932 in British Provinces and some Indian States	358
B. Deaths from cholera in rural and urban areas . . . . .	359
C. Deaths from cholera by months . . . . .	359
D. Deaths from plague by months—	
(i) British Provinces . . . . .	360
(ii) Indian States and Agencies. . . . .	360
E. Deaths from smallpox in rural and urban areas. . . . .	361
F. Deaths from smallpox by months . . . . .	361
G. Deaths from fevers and malaria in rural and urban areas . . . . .	362
H. Deaths from fevers by months . . . . .	362
I. Deaths from dysentery and diarrhoea in rural and urban areas { . . . . .	363
J. Deaths from dysentery and diarrhoea by months . . . . .	363
K. Deaths from respiratory diseases in rural and urban areas. . . . .	364
L. Deaths from respiratory diseases by months . . . . .	364
M. Quinine issued by Public Health Departments . . . . .	365
N. Sanatoria and other tuberculosis institutions . . . . .	372
O. List of leper asylums, homes, hospitals and clinics. . . . .	

## APPENDIX III.—RELATING TO SECTION III ON MATERNITY AND CHILD WELFARE.

Maternal death rates per 1,000 births in certain towns. . . . .	378
---	-----





which had been planned by the present Member in charge of Public Health as a first stage in effecting closer co-ordination between individual provinces in matters of public health. These and other developments must, it seems, await happier and more prosperous days.

A. J. H. RUSSELL, *Lieut.-Colonel, I.M.S.,*  
*Public Health Commissioner with the*  
*Government of India.*

SIMLA,

*June 28th, 1934.*

an expression of fear that the pruning knife might be applied so ruthlessly that progress in the development of public health would be brought to a halt and that the gains already made in the control and elimination of disease would be lost. The universal and often sweeping reductions in expenditure, even on such primary necessities as protected water supplies and drainage schemes, not to speak of medical research, anti-malarial works, medical inspection of school children and infant welfare and maternity relief schemes, are all evidences of the "false economy" which it was hoped might be avoided. Fortunately, these years of financial stress have been comparatively healthy, at least in respect of the major epidemics, but it must be remembered that, even before the present retrenchments were effected, the general opinion held by Directors of Public Health and their staffs was that no provincial health department in India had even the minimum requirements necessary for the efficient performance of its functions. This fact requires reiteration in order to counter the impression that nothing vital has been lost to those departments responsible for the public health. Moreover, it is a fact which must be kept in the foreground so that, when more prosperous times arrive, these departments may not be forgotten.

For the present, fresh developments have almost entirely disappeared but this report will have been written in vain if the necessity for advance in numerous directions has not been made clear. The expansion of medical research and the wider application of the knowledge made available by research has already been the subject of remark. The figures for malaria and "fevers" deaths have made obvious the urgent necessity for additional expenditure on anti-malaria works and for the wide distribution of cheaper supplies of quinine. Child welfare work and maternity relief provide enormous fields for vigorous action; it would be vain to cite further examples.

232. As regards the Central Government's Public Health organisation, the effect of the retrenchments of 1931-32 have now become more fully apparent. The abolition of the post of Assistant Director General (Sanitary), and the reduction of the clerical staff, operated inevitably in curtailing the time which the Public Health Commissioner could devote to touring and limited his activities in many other desirable directions. Within a short space of time, measurable probably in months, the constitutional reforms now under discussion will have been brought into force. And the public health problems with which the new Central Government will be faced are such as will demand urgent attention. It is difficult to understand how the present central health organisation could undertake the additional work which these problems must entail. More than one witness who appeared before the Parliamentary Joint Select Committee stated that a Ministry of Health was an essential feature of the future Government of India but this proposal, whilst it has received warm support from more than one experienced authority, still remains a mere hope for the future. Apart from central direction of policy which a well-organised Ministry of Health would be capable of planning, one of the most important requirements of this country is an all-India Public Health Act which will lay down the broad principles on which all public health development should be based. Unfortunately the financial position has even forbidden the creation of the Central Board of Health which was suggested by the Simon Commission and

department seems to have become divorced from the medical department "by mutual consent"; in the U. P. also the two departments are quite independent, and it would almost appear that the tendency has been for the Public Health Department of the province to swallow up the medical; in the other provinces there is either co-ordination or at any rate co-operation between the two departments. It is impracticable to draw a sharp line of distinction between medical relief and disease prevention. The ideal to be aimed at is to have effective co-operation between the workers who are engaged in these two forms of medical activity. Division of labour is desirable and even essential in certain matters but when we come down to the small units such as village dispensaries, India cannot afford to maintain two experts in each centre of population. There is no reason why the dispensary doctor should not assume responsibility for the general supervision of the health of the area in which he works. When there is an absence of liaison between the chief officers of the medical and public health departments it becomes impossible to maintain a satisfactory working arrangement of this kind in the smaller centres; this reason alone it is essential that there should be close co-operation between the two departments."

"There are historical reasons for the "diarchy" which exists in the medical and public health departments. In the early days of the development of modern medicine in India disease prevention was scarcely attempted except in the case of vaccination against smallpox. The view which held the field at that time was that the people had not yet been educated up to the necessity for preventive medicine and that any attempt to enforce unpopular public health measures, would do more harm than good. Medical effort was therefore concentrated on the establishment of hospitals and dispensaries for the treatment of the sick. When public health began to receive its due share of attention, the physicians and surgeons were already strongly entrenched, so that public health workers found it difficult to awaken any enthusiasm for preventive medicine amongst the administrative medical officers who were interested in their own specialities. It was therefore necessary for the public health workers to put up a vigorous fight to secure autonomy and, generally speaking, the result has been an undesirable cleavage between medical relief and public health."

"The position is now very different. The prevention of disease has come to be universally recognized as being the chief aim of medical work and most of the administrative medical officers are now enthusiastic advocates of disease prevention; indeed some of them have been specialists in public health for the greater part of their previous service. All of them state that they are prepared to co-operate with the Directors of Public Health and to insist on a similar co-operation on the part of the members of their staff. This combination of effort does not mean the swallowing up of one department by another, nor does it imply the elimination of the principle of division of labour. It does mean that whenever it is in the interests of efficiency and economy, the medical man ought to engage both in medical relief and public health work and that ever increasing emphasis must be laid on disease prevention."

"The recent financial crisis has compelled some of the provinces to explore possible means of retrenchment; among these are suggestions that there should be one administrative head for the combined medical and public health departments. If due weight is to be given to efficiency in the performance of medical and public health duties it is most unlikely that any curtailment of the higher directing staff will be possible. Even if the administrative head of the medical department were to be placed in charge of public health duties in addition to his own, he would still require to have an expert public health officer of the same status as at present to act as his deputy for public health work. A proposal which has found many supporters is that each province should have a Health Board under the presidency of the Ministers. The administrative heads of the Medical and Public Health Departments would be members of this board. Whatever system of administration be adopted in a province, it is most important that the officer who is in charge of public health should have full facilities for developing a public health policy, but at the same time he must work in close co-operation with the administrative head of the medical department. Equally the head of the medical side must co-operate loyally with the public health administration."

231. The details of provincial activities given in Sections IV and VII, which deal with Public Health Administration and Public Health Works, make it obvious that Public Health Departments in India, like those of most other countries, have been obliged to submit to retrenchment in many important directions. In some directions, the axe seems to have been used more or less judiciously and probably a certain amount of dead wood has been usefully removed, but in others the retrenchments are described as drastic and severe and, in these instances at least, a considerable degree of damage has been caused to young and actively growing departments. The report for 1930 ended with

and analysed. Although isolated cases had been reported from most provinces up till that year, these had never numbered more than a few dozen and in most instances had failed to reach double figures. The disease had been recorded in more intensive degree in one or two centres, however, and the city of Calcutta in particular reported a large increase in incidence as compared with previous years. The disease was also stated to be endemic in certain parts of Bengal, endemo-sporadic in Burma, Sind and the Punjab, sporadic though rare in the large cities of the Indo-Gangetic plain and the Madras Presidency. Only minor epidemics had occurred in Bombay Presidency and these would appear to have originated in Sind.

Conditions in India, therefore, differed to a very marked extent from those existing further East. Pandemic outbreaks had been recorded in numerous Far Eastern ports, more particularly in Hongkong and Macao, and the recorded figures demonstrated clearly the widespread severity of the disease in those areas.

At the time of writing, the position has become much more serious. During 1933 and the first half of 1934, cases have been reported from nearly every part of India and the warning forecast given in the memorandum referred to above has unfortunately proved to be only too accurate. Within recent months, several towns such as Ahmedabad and Delhi have suffered from severe and very fatal epidemics and it is to be feared that the infection will continue to spread and that further outbreaks will be recorded during the next few years. The terrible conditions of overcrowding which are so common a feature of many Indian towns and cities are almost ideal for the propagation and spread of this disease.

The Central Research Institute, Kasauli, has recently had under preparation an anti-meningococcus vaccine manufactured from cultures originally taken from cases in Delhi and this product is now under trial in selected communities. As the English Ministry of Health memorandum on cerebro-spinal fever states, no satisfactory data exist as regards the use of a preventive vaccine against that disease and "statistical evidence, on which alone its value could be determined, is peculiarly difficult to obtain in a disease of such erratic incidence." This difficulty exists in even greater degree in India but attempts are now being made to obtain accurate records of all persons inoculated with the vaccine. It is hoped that sufficiently reliable data will eventually be available to permit of a reasonable evaluation of this new prophylactic.

230. The question of greater co-ordination between the medical and public health departments is one which is by no means peculiar to India and which has not infrequently been the subject of considerable controversy in different parts of the world. No excuse is needed, therefore, for quoting what General Sir John Megaw has to say on the subject. The following paragraphs are taken from a paper written in 1933 in which he discusses "Some points connected with medical administration in India."

"Most of the administrative medical and public health officers state that a satisfactory degree of liaison exists between the medical and public health departments but there is a considerable variation in the degree to which co-ordination exists. In Bengal the public health

Some of these comparative figures seem to call for comment. It would be interesting to learn, for instance, why accidents were so much more common among "non-pensioners" as compared with the 'pensioner' class. This difference is more than counterbalanced, however, when we consider the figures for "heart disease." It is a little surprising, too, that deaths from pneumonia and tuberculosis taken together should amount to as much as 10-12% of the total and that nearly 4% of the 'non-pensioner' deaths should be recorded as due to tuberculosis.

228. Since the publication in 1931 of the report of the Royal Commission on Labour, the Government of India and provincial Governments have all been working under a cloud of financial depression which has necessarily prevented the initiation of schemes involving additional expenditure. A certain amount of progress has been made, however, in carrying into effect the recommendations made by the Royal Commission in regard to the health and welfare of the industrial worker whilst many of the larger problems in this field are under the consideration of the Governments concerned. The hope remains that, when the financial position improves, it will be possible to record greater advances than have yet been made.

One point arising in connection with industrial disease deserves some mention. The Royal Commission in the course of its report commented on the fact that a number of industrial diseases common in other countries seemed to be unknown or passed unrecognised in India. Silicosis of the lung was one of which no record was to be had but which might be expected to occur, for example, among the workers in the gold mines of Mysore. Dr. W. R. Jones has recently found that the mineral residue obtainable from the silicotic lungs of gold miners includes a proportion of sericite or 'secondary white mica.' Jones's evidence that sericite produces silicosis derives not only from its demonstration in the mineral residue of 29 silicotic lungs but from its distribution in accordance with the frequency of silicosis. It appears that the Mysore Government recently appointed a special committee to investigate the question of the prevalence of silicosis among the miners in the Kolar Gold Fields Area. After a preliminary investigation, the committee unanimously arrived at the conclusion that silicosis does occur among the underground workers. Careful examination of available material by the Miner's Phthisis Medical Bureau, South Africa, has also shown that the pathological and radiographic evidence "appears to create a *prima facie* case that instances of silicosis do occur among the underground workers in the Kolar Gold Fields". The committee was, however of opinion that the incidence of the disease in the Kolar Gold Fields is much smaller, and that it takes a much longer time to develop signs and symptoms, than in South Africa. This is evidently due to the fact that the percentage of free silica contained in Kolar rock is 5 to 20, as compared with the much larger percentage of 43 to 98 obtaining in South African samples. Further investigation is said to be in progress. This paragraph will perhaps indicate the necessity for a less dogmatic and more scientific attitude, in regard to the incidence of industrial diseases among Indian workers, than that adopted by several witnesses who appeared before the Royal Commission on Labour.

229. In a memorandum issued from the Public Health Commissioner's office in 1932, all available figures for cerebro-spinal meningitis in India were collated

"Events are in train for great issues, that is not in doubt. The deliberate adoption of a biological policy in Statecraft would give a new direction and intensification to our efforts and a new and more critical appreciation of achievement. . . . . With this biological ideal acting as a new driving force . . . . . we can look with confidence to brushing aside the apprehensions that at present cast a gloom over life."

227. For many years past it has been the custom to send to the Public Health Commissioner with the Government of India, for purposes of registration, records of all deaths in India of civil European officers. An analysis of the causes of death of 757 civil European officers,—196 pensioners and 561 non-pensioners,—who died in India between 1916 and 1932 may be of some interest to statisticians if not to historians. Table XII (i) gives the numbers of deaths from certain communicable diseases.

TABLE XII (i).

	Pensioners.	Non-pensioners
Cholera . . . . .	1	20
Smallpox . . . . .	..	5
Enteric fever . . . . .	2	21
Influenza . . . . .	1	12
Dysentery . . . . .	4	11
Diarrhoea . . . . .	1	2
Pneumonia . . . . .	19	47
Tuberculosis . . . . .	1	22
Total	29	140

Out of 388 deaths recorded during the last 11 years, 5 were due to cholera, 2 to smallpox, 7 to enteric, 4 to influenza, 4 to dysentery and diarrhoea, 37 to pneumonia and 12 to tuberculosis.

Table XII (ii) gives the percentages of total registered deaths from different causes for both pensioners and non-pensioners.

TABLE XII (ii).

Deaths from	Pensioners.	Non-pensioners.	Total.
Suicide . . . . .	0.5	5.5	3.0
Homicide . . . . .	..	3.9	2.0
Accident . . . . .	1.5	11.1	6.3
Heat stroke . . . . .	0.5	2.1	1.3
Liver diseases . . . . .	1.5	2.5	2.0
Kidney diseases . . . . .	1.5	0.5	1.0
Heart diseases . . . . .	24.5	15.9	20.2
Appendicitis . . . . .	0.5	2.5	1.5
Cholera . . . . .	0.5	3.6	2.0
Smallpox . . . . .		0.9	0.5
Enteric fever . . . . .	1.0	3.7	2.3
Influenza . . . . .	0.5	2.1	1.3
Dysentery . . . . .	2.0	2.0	2.0
Diarrhoea . . . . .	0.5	0.4	0.5
Pneumonia . . . . .	9.7	8.4	9.0
Tuberculosis . . . . .	0.5	3.9	2.2
All other causes . . . . .	54.8	31.0	42.9

controlled, and ante-natal and child welfare services would provide the results that Ballantyne rightly envisaged."

"It would mean some modification of our education code. . . . . A community that had made up its mind to produce healthy and vigorous citizens would endeavour to strike a new balance between book-learning and what I may call physical culture. We all know that great improvements have been made recently in this direction; and that there is a better understanding than formerly of the physical and mental needs of the growing child. Research into the psychology of "staleness" and so on clearly suggest that for mental development alone, physical activity must be an essential part of the school curriculum. Under such a conception the main concern would be to develop in the primary school child from 5 to 12 years of age his powers of observation, his desire for experimentation, and his recognition of the virtues of self-control, and in his post-primary course he would acquire a knowledge of facts with a minimum of drudgery and a maximum of happy, purposeful effort which would have some relation to the gifts that God had given him and would be helpful to him in later life. Under such a conception, also, the school teacher would become pre-eminently a teacher and practitioner of mental and physical hygiene."

"We have to keep in mind that the basis of our health services is the general practitioner. The rate of progress will be regulated to a large extent by the quality of the men and women who are carrying into the homes of the people the knowledge they have acquired of the science of medicine. Hence the importance of placing at their disposal all the facilities they require and of encouraging their ready resort to them. Hence, also, the importance of a careful scrutiny of the curricula of the medical schools. I do not think it will be disputed that an examination of the medical curriculum from the biological standpoint, from the standpoint, that is, of a statecraft that aims at the promotion of individual health would suggest obvious changes."

"Lastly, . . . . . but not lastly in importance,—there would be a more closely-knit and intensified effort to extend the boundaries of present knowledge. . . . . expenditure on research returns remarkably good dividends. There is an urgent need for a great extension of this work. There are problems crying aloud to be solved, and of some of these it can be said that only the lack of a little organisation delays their solution. But the achievements of medical research are already well in advance of their application to practical living."

"Our Scientific Advisory Committee on Medical Administration and Investigation has an enormous field for development here—our epidemiological technique, the factors in nutrition, the incidence of diseases of motherhood as an essential stage in the reduction of maternal deaths, rheumatism, mental deficiency and so on. And the cultivation of this field opens up a prospect of incalculable benefit to the community."

"I have cited enough examples, I think, to show our present organisation is defective, it lacks a unifying principle and to adopt as the conscious aim of policy the principle that lies implicit in some branches of our present activity would mean an all-round concentration of effort. This, in itself, would give us a much greater return than we are receiving for present expenditure. By concentration of effort I am far from meaning a fusion of agencies under unified control. There is a great virtue in diversity, and there should be ample scope for it in national and local policy."

"With this biological outlook, the health authorities would be able to relate their various activities to a common end. They would have a measure—not, of course, the only one; there is much in life beyond an organised health service—by which to assess the value of institutions, habits, and all the varied factors in the communal life."

"Whatever the factors are, however, and the weighting that should be given to each, there is no doubt that the people generally are alive to the advantages of physical well-being. . . . . They are not likely to lose that sense."

"What of the statesmen? . . . . . our health services have developed through the deliberate acts of the legislature. I have suggested that this principle of aiming at individual health has almost emerged of itself, and I am now submitting that it only requires deliberate formulation and application in national policy."

"The statesman, however, requires more material argument than the mere sensation of well-being or of the involuntary emergence of a theory from practice. I think it would not be difficult to demonstrate that the lack of this unifying principle is causing much waste of present expenditure. . . . . I think the politician and economist together have as obvious a task in organisation as the politician and the sanitarian have. In my view they have at least an equal opportunity. But in international competition, with all the complexity of modern industry and commerce, the race will be to the swift and strong. The nation that has the most adaptable and resourceful people will take the lead." . . . . ."



activities and for the further extension of public health organisations in this country. Although the latter have during recent years made definite progress and various epidemiological problems have been the subject of successful study and research, in one direction particularly there has been a distinct lack of development. The services of pathologists and bacteriologists are essential to modern public health administrations and all health authorities should realise the advantage of establishing well equipped laboratories as an integral part of their public health departments. The more easily and freely a medical officer of health or district health officer can use the services of a pathological or bacteriological laboratory, the more efficient will be his administrative work. Not only for routine examinations is the centralised laboratory essential but the medical officer of health should be in a position to advise upon research work into the nature and prevention of diseases with which he comes in contact. For a number of years past, investigation units have been attached to the King Institute in Madras Presidency and these units have proved of great value both in the solution of specific health problems and in the investigation of outbreaks of disease puzzling to local health officers. Unity of health administration however means more than a district organisation complete in itself and the headquarters' laboratories usually found in provincial capitals are not now sufficient to meet every need. In rural areas, it should be possible for a group of districts to keep a laboratory in full work and every laboratory of the kind should act as the centre for all examinations and investigations required in the group. This is a development which is badly required throughout India and is one which demands early attention from those who are responsible for provincial public health organisations.

The train of thought which emerges from the preceding paragraphs is clearly expressed in the following extracts taken from Dr. Parlance Kinloch's Presidential address to the Preventive Medicine Section of the Royal Sanitary Institute Congress held in Glasgow in 1931. Not only do they form a logical sequence to these paragraphs but they successfully complete the arguments which have there been adduced.

"The concept that is implicit in much of our present health services and finds as yet only spasmodic acceptance and expression, should be definitely accepted as the deliberate aim of policy. One of the fundamental aims of State-craft, I am suggesting, should be the promotion of the health of the individual to the end that as a race we may grow in health and vigour. In a way, it is a return to the old Greek ideal; and on that account even more than on the half-acceptance of the ideal in our present policy, my plea is not original."

"The acceptance of this ideal as a guiding principle means, in the first place, that both as administrators and medical men or, better, as biologists, we are more concerned with life than with disease. We become profoundly anxious that good nurture should obviate the need for treatment..... to anyone who surveys our modern health services.... and contrasts what has been achieved in improved health of the people with what we know would be achieved by the organised application of even existing knowledge, there is no resisting the conclusion that either our aim is not clearly defined in our minds or our efforts towards its realisation are only half-hearted."

"In the second place, the conscious acceptance of this principle means that the assessment of fitness in the individual is a matter of dominant importance. This means some re-orientation of outlook, both in medicine and physiology. In medicine it means that the examination of disease in the individual in every case leads up to the assessment of the degree of incapacity. It means a new heading in the medical textbooks. In physiology it means that the study of nature and nurture and function all lead up to assessment of physical and mental fitness."

"The acceptance of this principle would definitely modify our present health policy and immediately intensify our efforts and greatly extend their range. With the application of knowledge and concentrated effort, motherhood would be protected and sepsis

"No greater proof is required of the fact that what primarily ails India is over-population than the low, miserably low, standard of living of the masses. This would indicate that the actual position of the Indian population in the Logistic curve of population growth is possibly very near E round about which point, if Nature's Law is to be obeyed, any further increase in the population should be practically nil. In other words, there should be, very nearly, only as many babies born as there is wastage due to deaths. To subject the soil to increased pressure due to the addition of nearly 34 millions in a decade when the standard of living is proverbially low is a situation that should cause real alarm in the minds of well-wishers of India. Without an addition in real wealth of, at least, the same extent, of which there has been no very large indication, the existing low standard of living is sure to be depressed further, leading, as has already been indicated, to further over-population and consequent increase in the loss of the spirit of enterprise. For, successive generations of life on less than bare margin of subsistence and the natural indolence and despondency which such a state engenders have probably made the majority of Indians abstain from making any strenuous effort to raise their standard of living, which could be achieved in the first instance by limiting the size of the families. Being itself both the cause and effect of over-population the low standard of living of the average Indian completes what is called the 'vicious circle'."

226. This section of the report would inevitably be incomplete were no mention made of medical research. In spite of retrenchments and the consequent compulsory restriction in the allotment of grants, the Indian Research Fund Association has been able through these years of stringency to continue every major enquiry which was in progress before the slump occurred. It has also been able to allot grants to a considerable number of what might be described as minor enquiries. This has, however, only been possible by drawing on accumulated funds but that was done in the full hope that as trade and commerce revived so would those revenues from which in the main the Association is financed. Section VIII contains a brief epitome of the researches conducted during 1932 and in the Appendix to that section will be found a complete list of the scientific papers published by the workers who obtained grants from the Indian Research Fund Association. These indicate what it has been possible to do in spite of retrenchment and, in the circumstances, they provide matter for sincere congratulation. Attention is also invited to the paragraphs in Section IX which contain a brief description of the researches carried out in different medical colleges throughout India. Obviously, it is to these institutions that this country must look for most of its future recruits to the Medical Research Department.

The politician often shows reluctance to divert to scientific research money which might appear to yield a more speedy and substantial profit if applied to other spheres of activity. "On the supposition that the concern of a democratic Government is for the greatest good of the greatest number, few would question that health of body and mind is as great a good as any. To secure and promote this health more money is needed for research and there is no room for complacency with things as they are." In the words of the Medical Research Council's report for 1932-33—"It can indeed be claimed, without fear of serious contradiction, that the total amount of disability and the extent of human suffering have been immeasurably reduced by the combined efforts of investigators in all parts of the world." It is to be hoped that the restrictions, under which medical research in India now labours, will be removed as soon as the present financial position improves. In no direction will the taxpayer obtain better value for his money.

"Systematic investigation, experiment and disinterested epidemiological enquiry is the life blood of preventive medicine." These words of Sir George Newman may be used in support of a plea for expansion in medical research

sexes in their 'teens.' It is just possible that this dip in the 1931 curve is the result in part of the depletion, by the influenza epidemic of the end of the last decade, of females of the reproductive ages. It is however pointed out by the Census Superintendent for Central India that there is a general tendency to lower the age of boys for whom matrimonial arrangements are being made; allusion to the prevailing misstatement of the age of girls has already been made, while in regard to boys the Superintendent of Census Operations for Madras may again be quoted :—

"The Indian outlook on age is, as remarked, much more functional and the advent of so pronounced a vital phenomenon as puberty exercises probably a considerable influence on age returns. If it has arrived, the tendency will be to attribute definitely mature years; if it has not, the tendency may be to diminish the actual tale of years due. Much of this is of course conjectural but the actual age return curves dealt with already do show peculiar aggregations at ages between 10 and 15 and after 20."

"The vital statistics of India, are well known to be defective. They are compiled from records maintained locally by means which vary in different provinces, but generally they are kept up by the reports of village officials in rural areas and by municipalities in urban. In the latter case their accuracy will naturally depend on the amount of interest taken in the matter by the urban authorities. This is not great, and even the rural returns are probably more accurate on the whole. In them however, the reporting of the occurrence of births and deaths is often a troublesome duty which the village headman or *chaukidar* is apt to neglect. Obviously in the case of births he is likely to wait and see whether a child will live and so save himself in many cases the necessity of making a second report for its death, while he no doubt hesitates to report deaths which would give any excuse for the unwelcome visits of unduly suspicious police officers. Taken on the whole, the defect in vital statistics is probably to be estimated at about 20 %, though it is much higher at its maximum. For example in Mysore State the deficiency is put at 50 % or even more. The returns from which birth and mortality rates are deduced, . . . . . can therefore be only accepted subject to reservation. They are however probably reliable enough as indications of the general trend of birth and death rates, even though the gross figures themselves are understated in both directions, and in Madras Province the returns are accurate enough to have made it possible for the Department of Public Health to prognosticate the result of the 1931 Census with an error (on the excess side) of not more than 2 %. Bengal and the U. P., in that order, are believed to be the next most accurate in respect of their returns, although the Census Superintendent of the latter province estimates the percentage of error in the record of births as 15 % and in that of deaths as 22 %. In Assam the Census Superintendent considers that "at least one third of vital occurrences go unreported," and that with reference only to the areas in which vital statistics are theoretically maintained."

"The question of population and age necessarily involves some reference to the question of infant mortality—that is to the number of infants, *per mille* born, who die during the first year of life. The infant mortality rate has long been notoriously high in India as compared with most countries in the west of Europe, but is not nearly so high as that, for instance, of Chile, and from 1910-25 was comparable with that of Hungary, while it was considerably lower than that of the Straits Settlements. The rate of infant mortality in India during the decade under review shows an appreciable reduction on the rate of the previous decade even if allowance be made for the heavy mortality of the influenza years. . . . . It is in towns that the highest infantile mortality is found."

Mr. Vaidyanathan also discusses the question of population in his actuarial report attached to Dr. Hutton's chapter on 'Age', and his opinion is worth quoting.

"One can judge whether or not a country is suffering from the effects of over-population by the standard of living obtaining in the country, as economists hold that low standard of living is a sure index of over-population. When the number of mouths is considerably larger than the capacity of the soil to provide food for them, the standard of living should naturally fall. Let me quote from what Carr-Saunders says in this connection with particular reference to India and China."

"Infanticide was employed in India and China until recently; it has now been abandoned and no other method of keeping the size of the families small has taken its place. An examination of the social conditions suggests that the people are not living as well as they might; famines are not uncommon and are never far off. The symptoms point to over-population, of which the cause would seem to be the failure to replace the custom of infanticide by some other method of regulation."

the same kind; they also indicate the necessity for active developments in the agricultural, economic, educational and public health spheres in every province. Space forbids further comment, but the question of diet, and especially the diet of children, is so vitally important, and the milk supplies in this country are so utterly inadequate, that these must serve as justification for quoting one brief paragraph from the joint report recently issued by the Ministry of Health's and the British Medical Association's Nutrition Committees. This reads :—

“ All recent studies on the nutrition of children have shown that milk is for them a valuable food. It is indeed the only naturally balanced food we know of, containing as it does in readily available form not only first class protein (18·7 grammes or  $\frac{3}{4}$  oz. to the pint) but also minerals, vitamins, carbohydrate and fat. The conference therefore desires to stress the importance of this highly nutritious food for the child and the nursing and expectant mother. Both (Committees) were mindful of these facts in regard to the special needs of the child, and both stressed the importance for children of the provision and consumption of milk in adequate quantities.”

In continuation of the discussion on population and those other problems associated with numbers, attention is invited to the remarks made by Dr. Hutton, the Census Commissioner, on the questions of mean age, expectation of life and vital statistics in his final volume on the Indian Census of 1931. As his report may not be generally available, the following paragraphs are reproduced :—

“ The mean age in England and Wales in 1921 was 30·6 and that in Northern Ireland in 1926 was the same, whereas that of India is only 23·02 and it would seem that the expectation of life at 24 years is under 25 years except in Madras. This conclusion is arrived at from the actuarial report on the 1901 census, which also indicates that the expectation of life in India 30 years ago was greatest between 4 and 9 years and at no age attained 40 years, though it came nearest to doing so in Madras. In the Public Health Commissioner's report for 1927 the expectation of life in India at the age of 5 was quoted as 35 years.”

\* \* \* \*

“ According to the 1901 investigation the expectation of life in India is slightly greater at birth for females than for males but thereafter is appreciably less until the age of 20 years, when females may again expect a longer life than males of the same age, and thereafter their expectation of life is slightly better throughout. The inference is that the female infant has greater vitality at birth, but is more likely to succumb first on account of the greater tendency in India to neglect girls in favour of boys and secondly on account of the risks of early marriage. The actuarial examination in 1911, however, gave, with less probability perhaps, a better expectation of life for females at all ages up to 80 when the expectations were equalised, the male expectation going very slightly ahead at 84 years. At the same time the 1911 examination gave a slightly decreased expectation of life for both sexes and all ages as compared with that of 1901, while the 1901 expectations repeated there were not quite so high as those of 1891. No rates at all were worked out from the census returns of 1921, as the actuary considered that their interest would be purely academic, and that the returns were not reasonably dependable. It would therefore be unwise to attach too much importance to the life tables of previous decades. The constant figure for the mean age at this census as compared with previous ones and in conjunction with the consistency of the decennial age groups suggests that the expectation of life has not much altered since 1891.” “ The expectation of life as deduced by the Actuary from the 1931 returns shows an expectation at birth of 26·56 years for females and 26·91 for males; at the ages of 4 and 5 years, respectively, when the expectation is at its best, it is 36·75 for females and 38·96 for males. Attention is drawn to the superior expectation enjoyed by males. The figures are for India as a whole.” ..... “ As regards Indian mortality rates generally, it is to be inferred from two articles published in the *Journal of the Institute of Actuaries* in July, 1929, that the mortality rate rises to a maximum at about 55, though in other respects following a similar course to that of the United Kingdom. It also appears that, of Indians who insure their lives, Hindu mortality is slightly higher than that of other groups, Parsis experiencing 0·66 of Hindu mortality, Europeans 0·75, Anglo-Indians 0·79 and Muslims 0·92, though this last figure must be accepted with reserve, as owing to their objection to insurance on religious grounds very few Muslims insure their lives at all.” ..... “ A recurrent feature of the Indian age returns is the dip in the curve at the age group of 15-20. This feature, which is much the same in both sexes, is usually ascribed to more or less intentional misstatement of the ages of both

information it seems likely that the disease is increasing steadily and rather rapidly. The estimate of just over two million cases of tuberculosis in India as a whole is probably much too low: every large town is known to be very heavily infected, and therefore an estimate which is based solely on the incidence of the disease in the agricultural villages must be unduly favourable."

"Tuberculosis is a disease which has very special importance in India for the reasons—(1) it is likely that many villagers have never come in contact with infection and therefore are "virgin soil" on which the disease is likely to thrive, (2) the infection is being steadily spread from the large towns to the villages, (3) the disease constitutes a reliable index of the standards of life which prevail in countries in which it has become established for long periods of time: it spreads rapidly among illnourished and badly housed populations and correspondingly diminishes when the people are well fed, well housed and cleanly in their habits."

"*Insanity and Congenital Mental Defect.*—The figures for insanity and mental deficiency taken together show that these diseases are less common than in western countries, viz., 1·7 *per mille* against 4 *per mille* in the United Kingdom. Assam and Bengal show fairly high figures of about 3 *per mille*. The census figures show only 0·3 *per mille* cases of insanity; they do not include mental deficiency, but even when allowance is made for this it is evident that the census estimate is much too low and that the present survey is likely to give a much more accurate picture of the true state of affairs."

"*Blindness.*—If the figures given in the survey are accepted as being representative, there would be 5·5 cases *per mille* in India against only 1·5 *per mille* reported by the official census for 1921. The census figures are certainly unreliable: in every case in which they have been checked by a detailed investigation they have been found to be far too low. For example, in the Nasik district it was found that there were thrice as many blind as were shown by the census and in other places similar results were obtained by a careful investigation. It is therefore probable that there are nearly two million blind persons in India though some of these may not be totally blind."

"The information which deals with the causes of blindness is rather vague: among 2,750 cases of blindness the causes were stated in 1,620 and were as follows:—cataract 618, glaucoma 258, smallpox 256, trachoma 218, interference by quacks 90, ophthalmia neonatorum 85, conjunctivitis 51, and born-blind 44. In the remaining 1,130 cases the causes were not stated. It is surprising that keratomalacia is not mentioned, as this is regarded as an important cause of blindness in southern India. Here again a detailed and accurate survey is badly needed."

"*Age at which Cohabitation and Child-bearing begin.*—The figures showing the average ages at which girls begin to cohabit with their husbands and give birth to their first child are the most important and significant of the whole series. In the ordinary course of events girls begin to cohabit at the age of about 14 years and have their first baby at 16. The remarkable uniformity of the estimates of the ages of cohabitation and first pregnancy shows that these figures can be accepted as being reasonably accurate: they indicate that the normal custom is to impose the cares and dangers of motherhood on immature girls at an age when they ought to be attending school. Considering the early age at which child-bearing begins, the average number of children born to each mother is lower than would be expected; it is probable that the young mothers usually become worn out and incapable of having children before they reach the age of 30. The figures showing the average duration of lactation are in accordance with the prevailing impressions on the subject. The prolonged period of lactation imposes a very heavy strain on the vitality of the young mothers."

"*Maternal Mortality.*—The maternal mortality rates are extremely high except in the C. P. where they are much lower than in any other province. The rates for Bengal are almost incredibly high—nearly 50 *per mille*. It is true that even higher rates have been found by Dr. Balfour in small population groups in Assam, but an average rate of nearly fifty *per mille* in 69 villages taken at random in Bengal seems to call for special investigation. In the report of the Public Health Commissioner for 1930 there is an account of a valuable detailed enquiry into the maternal mortality in 16 municipalities of the Madras Presidency. Among 32,000 cases the mortality was 15·4 for each 1,000 births, whereas the present census shows a rate of 13·24 for the rural areas of the same province. Unfortunately there are very few reliable estimates of the maternal mortality rates in rural areas of India so that there is no means of applying a check to the other figures given in the survey. The rate for India as a whole is 24·5. Even when the fullest allowance is made for errors in the survey, this figure is alarming. In England great concern is expressed because the rate continues to be so high as 4 *per mille*."

No absolute accuracy is claimed for the figures on which these comments are based but they may be accepted as giving an approximate estimation of existing conditions in the average village community. As they stand, the figures demonstrate clearly enough the necessity for more detailed surveys of

of food it is the quality of the diet that is at fault rather than the quantity; animal proteins in the form of meat or milk are taken in very small quantities; fruits and vegetables are seriously insufficient in most villages at certain seasons of the year. The amount of milk which is consumed is surprisingly small except in the Punjab where the average works out at 10 oz. daily for each adult. In the U. P. it is 5 oz., in Bombay 4 oz. and in the other provinces 3 oz. or less. *Ghee* is consumed in negligible quantities of one-tenth to a third of an ounce except in the Punjab where it is rather over one ounce and in the U. P. where it is reported as being just over half an ounce. As *ghee* is a very overrated source of vitamins, its shortage is of much less importance than that of fresh milk. Without claiming any great degree of accuracy for the evidence which relates to the diets, the data correspond fairly closely with the impressions of those who have interested themselves in the matter: it is evident that the supply of available proteins, fats and some of the vitamins is seriously inadequate except in a few favoured localities."

"The information supplied by the village doctors on the subject of diet is entirely in keeping with the results of the investigations made by Colonel McCay, I.M.S. about 20 years ago in Bengal. Colonel McCay and other observers have found that the Indian school boy shows a much lower gain in weight than boys of the corresponding ages in Europe and they ascribe the difference to the unsuitability of the Indian diets, especially to their deficiency in the body-building proteins."

"*Population and Food Supply.*—In nearly 40 % of the villages it is considered that the population is excessive in relation to the available food supply. In B. & O. nearly 60 % of the villages are said to be over-populated: in Bengal and the Punjab the percentage is about 46. The figures which deal with this question have no statistical value; they merely represent the impressions formed by dispensary doctors whose replies are based on their personal views as to what constitutes a reasonable standard of existence. It is likely that most of the medical men who were engaged in making the survey would be prepared to accept rather low economic standards of life as being adequate for the villages: indeed in many cases in which the food supply was stated to be sufficient, there was plenty of evidence in the replies to other questions that this was far from being the case."

"*Disease Incidence in the Villages.*—As is the case with most of the other statistics which are given in the tables, the figures of diseases prevalent must be accepted with great reserve. Few of the doctors are in so close touch with the villagers that they can give reliable information with regard to the incidence of each of the diseases which are dealt with. In the cases in which it is possible to check the data against other sources of information it is found that there are many discrepancies in details, but the averages for the whole of India correspond fairly closely. It may therefore be claimed that the figures give a fairly good general idea of the prevalence of certain diseases. In the case of other diseases such as rickets, syphilis, gonorrhoea and tuberculosis nothing short of a detailed survey by trained observers could be relied on to supply accurate data."

"*Rickets.*—Rickets, a disease caused by a deficiency in the diet appears to be very much more prevalent in Bengal than elsewhere and least common in Assam and the Punjab."

"*Night-blindness.*—This is caused by a different kind of dietetic deficiency: it is reported as being excessively common in the U. P. and rather uniformly distributed throughout the rest of India except Bombay which is remarkably free from the disease. Here again no inference can be drawn except that two forms of dietetic deficiency are comparatively common in India as a whole."

"*Syphilis and Gonorrhoea.*—Appear to be more common than has been usually believed: Bengal and Madras easily head the list. The data suggest that something like 5½ millions of people in India actually show signs of syphilis so that if account be taken of those who have had the disease and have lost all obvious signs, it would probably be well within the mark to assume that 10 to 15 % of the inhabitants suffer from syphilis at some time or other during their lifetime. The strikingly low rates of venereal disease in the Punjab are entirely in keeping with impressions based on other sources of information."

"*Leprosy.*—The estimate of 750,000 cases of leprosy in India corresponds fairly closely with the opinions which are based on surveys by experts: it is probably on the low side although it is far higher than the census figures."

"*Tuberculosis.*—Tuberculosis is evidently very wide-spread throughout the villages of India but is specially serious in Bengal, Madras, the Punjab and B. & O. Pulmonary tuberculosis seems to be much more common than extra-pulmonary except in the U. P. and Bombay. The low incidence in the C. P. is remarkable and is perhaps associated with the sparse distribution of the population and with defective means of communication."

"Tuberculosis is well known to be exceedingly prevalent in the cities and large towns but little is known as to its incidence in rural areas. The evidence of the dispensary doctors goes to show that the disease is very widely disseminated throughout India. From other sources of

## SECTION XII.

## Conclusion.

224. It has been customary to include in this final section some general remarks on such topics as could not conveniently be inserted elsewhere and to invite specific attention to important items concealed in the mass of statistics presented in previous pages. In last year's report Major-General Graham's exhaustive summary of public health events has made clear how much has been accomplished during the previous 10 years and equally clearly has indicated how much still remains undone. On this occasion, comment will be confined to one or two questions of basic importance for the health and welfare of the peoples of India.

225. The population problem, which has received brief mention in the first section of this report, must always be intimately associated in the minds of public health workers with such matters as food supplies, diet, physique, infant mortality and general disease incidence. Indeed it would be difficult to discuss any of these without touching on the question of numbers. It seems entirely appropriate therefore to give here a few extracts, very relevant to that subject, from Major-General Sir John Megaw's pamphlet entitled "An enquiry into certain public health aspects of village life in India." This paper attempts to make a broad survey of certain aspects of village life which have a bearing on the health of the people. The information, on which the survey was based, was obtained from 571 reliable answers to a questionnaire issued to doctors whose dispensaries were situated in typical agricultural villages scattered throughout British India. General Megaw made no claim for the correctness of every detail but he considered that from these random samples it was possible to get a general idea of what was really happening in the villages.

*"Average Size of Families."*—The average number of members of each family in the agricultural villages varies from 5 in the Central Provinces and Madras to 6.4 in the Punjab; in all the other provinces it ranges from 5.2 to 5.78, the average for the whole of India being just under 5.5.

*"Average Area of Land Cultivated."*—The average area of land per head of the agricultural population ranges from 1.45 *bighas* in Bengal to 5.27 in the Central Provinces (0.72 to 2.63 acres), but of course the yield of crops in different parts of the country varies so greatly that the actual area of land which is cultivated conveys little information as to the real income of each family."

*"Physical Condition of the Villagers."*—The figures which deal with the state of nutrition of the villagers are frankly impressionistic but they are not likely to convey an exaggerated idea of the number of people who are poorly or badly nourished; the village doctors are unlikely to have adopted a high scale of standards in this matter and it is probable that the figures would have been even more unfavourable if European doctors had made the estimates. Taking India as a whole, the dispensary doctors regard 39 % of the people as being well-nourished, 41 % poorly nourished and 20 % as very badly nourished. The most depressing picture is painted by the doctors of Bengal who regard only 22 % of the people of the province as being well nourished while 31 % are considered to be very badly nourished. It is impossible to express any dogmatic opinion as to the relative influence of insufficient diet and disease on the physical condition of the villagers but it is obvious that diet must play a very important part."

*"Diet."*—Enquiries were made as to the average quantities of each important article of diet consumed daily by adults, but the figures were found to be incapable of satisfactory analysis and therefore they have not been included in the tables. There was, on the whole, less evidence than might have been expected of actual shortage of food; in most of the villages three meals a day are said to be more common than two and the quantity of food consumed is usually sufficient to satisfy hunger. Although there are a fair number of reports of insufficiency

to undertake in the villages. The association also conducted for some time a general campaign on food values and attempted to popularise the use of cheap but nutritious foods. Since June, 1933, it commenced a scientific experiment in connection with the diet of 110 inmates of the Byramjee Jeejeebhoy home of the society for the protection of children in Western India.

#### **Health Propaganda Board, Madras.**

Having felt that it was time to take stock of the activities of medical inspectors of schools and to attempt improvement of their work especially at a time when these medical inspections had been abandoned by local bodies because the government grant was not forthcoming, the board organised a provincial conference of medical inspectors of schools, the first of its kind in the Madras Presidency. At this conference various suggestions were made for the removal of defects in the methods of inspection of school children.



An interesting development in the service was the deputation of Dr. Jean Orkney, specialist in maternity and child welfare, to the All-India Institute of Hygiene and Public Health, Calcutta, for the purpose of organising the section of that institute which will deal with maternal and child welfare.

### **\*Lady Minto's Indian Nursing Association.**

222. The following nursing homes and hospitals are staffed by nursing sisters of the Association :—

- (1) The Walker hospital, Simla, (2) the Ripon hospital, Simla, (3) Hindu Rao hospital, Delhi, (4) The Georgina McRobert hospital, Cawnpore, (5) Portmore nursing home, Simla, (6) the Kashmir nursing home, Srinagar, (7) the railway hospital, Ajmer and (8) the Lady Willingdon nursing home, New Delhi.

It was gratifying to note that in spite of the marked decline in the number of Europeans in the services in India, the amount received in subscriptions by the Association as a whole was slightly in excess of the previous year. During the year the nursing sisters attended 2,976 cases, including 1,321 medical, 1,133 surgical, 343 infectious, 3 mental, 9 massage and 167 maternity. 22 cases were refused as nurses were not available at the time of the request.

### **Other Indian Voluntary Health Societies.**

223. These are usually local or provincial societies unconnected with any all-India or central organisation. The activities of two of these, for which information is available, are briefly reviewed.

#### **\* The Bombay Presidency Baby and Health Week Association.**

During 1933 this association rendered help in various ways to 269 centres or 25 more than in 1932. Of these, 56 were given the loan of the sets of models, cinemas, magic lanterns and literature, these being sent out in charge of the association's trained workers to health and child welfare exhibitions ; 64 centres took advantage of the association's outfit only and arranged lectures and demonstrations ; 9 centres were supplied with the association's cinema films on health and child welfare topics ; at 23 centres, health lectures were arranged ; 61 centres were supplied with sets of lantern slides on child welfare and on preventible diseases ; and the remaining 56 centres were supplied with literature and detailed practical suggestions for the organisation of exhibitions. A total of 617,875 persons attended the exhibitions and cinema and lantern demonstrations arranged during the exhibitions.

In many towns including Bombay, one-day health exhibitions and cinema demonstrations for mill workers were arranged by the association in co-operation with the Chief Inspector of Factories and his department, the estimated attendances numbering 38,100.

The association, being anxious to take its share in the rural uplift campaign, submitted its suggestions to the D. P. H. and the Surgeon General with the Government of Bombay in regard to the propaganda work which it was able

---

\* Relates to the work for the year 1933.

The effects of sodium hydriocarpate on rat leprosy bacilli was tested in vitro. The results of these experiments tend to undermine the so-called scientific basis for the use of chaulmoogra oil as established by Walker and Sweeny.

*Pathology.*—The systematic study of leprosy lesions was continued and a paper on nerve lesions was published in the International Journal of Leprosy. The results of a study into bacillæmia were also published in the Indian Medical Gazette.

*Bacteriology.*—Attempts were made, so far without success, to follow the methods of McKinley and Soule and of McKinley and Verder in culturing human and rat leprosy. These workers claim to have cultured the lepra bacillus but their work has not yet been confirmed by others.

*Immunology.*—Many experiments with the leprolin test were made. Two articles were published on this subject in "Leprosy in India" (October, 1933, and January, 1934). This test is of importance in diagnosing leprosy, in regulating the treatment and in determining its length; it is also hoped, with its aid, to investigate the epidemiology of the disease.

*Propaganda.*—The quarterly journal "Leprosy in India" continued to publish a variety of scientific and popular information. The journal is a very useful link between anti-leprosy workers in India and abroad.

Two short courses on leprosy were held in Calcutta, one in February and the other in October, and were attended by 56 doctors. 15 doctors also attended similar courses at the leprosy hospital, Dichpalli. A large number of medical men were trained locally by leprosy experts in the various provinces and states.

Although the continued financial depression under which the work had been carried on operated as a handicap to activities, nevertheless workers everywhere rose to the occasion and did their best not only to maintain the ground already covered but also to extend that ground wherever possible. This is a real testimony to the new interest which has been awakened in the modern methods of treatment based as these are upon tangible results. The leper has thus slowly begun to feel that he is not an outcast, that his life is not doomed but that his disease is curable and that his return to a life of usefulness is not an impossibility. That the Association has been able to play a large part in bringing a ray of hope into the minds of a class suffering from depression and distress is more than satisfactory.

### **The Countess of Dufferin's Fund and Women's Medical Service.**

221. The Dufferin Fund spent its annual income as usual on scholarships to medical students and grants to various provincial Dufferin Funds for the maintenance of women's hospitals. 27 scholarships were given to students at the Lady Hardinge Medical College; of these 18 were awarded from the Association's funds and the others from Trust funds administered by the Countess of Dufferin's Fund.

The Government of India reduced its annual grant to the Countess of Dufferin's Fund from Rs. 3,70,000 to Rs. 3,44,300.

province. The survey work carried on in Bengal under the direct supervision of Dr. E. Muir was of special importance and very valuable data have been collected with regard to the incidence and endemicity of the disease. The experimental survey instituted in B. & O. to find out the relative importance of dietetic and medical treatment in leprosy was of special interest and value. In Assam, 1,314 cases were detected in a limited area ; in Bengal, apart from the provincial survey, 25,895 students in 31 Calcutta schools were examined, of which 109 were found to be lepers. Similarly in the C. P., the examination of 10,907 students in 175 schools revealed 49 cases of the disease. In Burma, it was shown that the real incidence of leprosy was 12 times higher than that shown in the census report. The disease has thus been found to exist in most unexpected quarters and these new facts have emphasised the complications inherent in an anti-leprosy campaign. Lectures to medical students were arranged wherever possible ; steps were taken to improve leper homes in the Punjab and the C. P. ; lantern lectures and illustrated talks were given in Mysore during festive gatherings.

One outstanding feature of the year was the various leprosy conferences which were held. Among these may be mentioned (a) the Leprosy Commission of the League of Nations, which made the following recommendations :—

- “ The prophylaxis of leprosy is not a problem capable of solution by the application of any one measure, as the methods of dealing with it must vary with the geographical, economic, administrative, financial, and other conditions of the countries where it exists ; ”
- “ Experience would seem to indicate that divergent as are the various scientific conceptions and interpretations of the facts, it should be possible for leprologists to come to an agreement as to a practical programme and to formulate working principles sufficiently accurate to be recommended to the health administrators, doctors, and hygienists who have to deal with leprosy ; ”
- “ The prophylaxis of leprosy may be achieved by a system of medical, educative and legislative measures. It should provide for the isolation and treatment of infectious lepers and particularly for the treatment of early cases in clinics dispensaries ; also for the periodical examination of suspects. Special measures should be adopted for dealing with the children of lepers and for patients who have recovered either after treatment or spontaneously ; ”

and (b) the conference held in Calcutta to discuss how far the recommendations of the Leprosy Commission could be applied to local conditions in India, to formulate a scheme for carrying out the most important of these recommendations and generally to make plans which should be a guide in the campaign against leprosy in India. Following this conference, a rural investigation centre was opened in Bankura which has been shown to be one of the most highly endemic districts in India. The objects of the centre are (a) to test the possibility of controlling leprosy in a limited area by means of concentrated work ; and (b) to investigate the epidemiology of the disease by the careful study of the spread of the disease in villages over a prolonged period.

*Research.*—Research work was continued at the School of Tropical Medicine, Calcutta. Experimental treatment with mercurochrome, methyl blue, trypan blue and fluorescein was carried out. The results obtained with first of these were published in two articles appearing in the Journal “ Leprosy in India”. Another line of experimental treatment was carried out with bacillary emulsions, sterilised suspensions of human and rat leprosy being injected intradermally into circumscribed lesions.

riots lasting for about 2 months in the middle of the year, 1932 was a period of stress and anxiety, and the brigade members were afforded many opportunities of service and were severely tested. The Bombay Corps rendered valuable services to the injured ; these were much appreciated by the Government of Bombay.

**\*British Empire Leprosy Relief Association (Indian Council).**

220. This Association which is now 9 years old may be said to have completed the first stage of its growth. The main activity during this growing stage has been the organisation, planning and outlining of a programme of work followed by the selection of the areas most suitable for experimental work. The labours of these years have, however, led the Association to a position of considerable strength and importance in the field of public health work in the country, for these have helped appreciably to remove the doubts, the suspicions and the superstitions with which the problem of leprosy had formerly been associated. Knowledge of the causation, prevention and treatment of leprosy has become more widespread and the means of obtaining proper treatment for the disease has been placed within more easy reach of the patient. At the back of this achievement lies the painstaking work of the scientist, the activities of the propagandist and the labours of a devoted band of doctors and social welfare workers who have whole-heartedly co-operated in the scheme of work set into action by the Association.

Considering the magnitude of the problem which the Association has taken up, it is still too early to look for very marked results. These may perhaps be expected after a generation has been brought under the influence of its work. By means of its numerous clinics and propaganda-treatment-survey centres, closer contact has been established with the leper population. The workers of the Association are no longer an aversion to the villagers whom they visit for purposes of surveys, propaganda and treatment ; the leper has become less prone to hide his disease and an increased general interest in the subject has become evident.

The headquarters and provincial branches of the Association both played their parts in furthering the anti-leprosy campaign in their respective spheres, there being now 17 provincial branches including that of Mysore State. Each of these endeavoured as best it could to establish treatment centres for leprosy patients. In Assam, the number of clinics rose to 145 from 81 in 1932 ; B. & O., Bombay, Bengal, Punjab and Burma also recorded increased numbers ; in other provinces, although no new clinics were opened, the numbers of lepers treated increased considerably. In Madras, the previously remarkable position in the matter of clinics and their activities was further improved and the number of these centres rose from 219 in 1932 to 322 and total attendances from 380,050 to 526,046. In the Salem district alone, where propaganda and social work among lepers attained remarkable success, 13 new clinics were established bringing the total to 41 with total attendances numbering 123,248. Propaganda work and surveys were done side by side with treatment and surveys of varying degrees were undertaken in almost every

\* This includes the work of 1932.

during the year had to struggle against financial depression. Fortunately only in a few cases was it found necessary to close down centres.

*Victoria Memorial Scholarships Fund.*—This fund is administered by the Bureau and is spent in training indigenous *dais*. An increasing tendency for concentration of the *dais* in schools was reported.

*King George's Thanksgiving (Anti-tuberculosis) Fund.*—The objects of this fund are to fight against tuberculosis in India but the shortage of money severely restricts its activities. During this second year of the Fund's existence, however, great progress was made. It set itself to organise committees in the provinces of British India as well as in the Indian States with a view to spreading knowledge concerning the causes and prevention of tuberculosis and to creating a public conscience in the same connection. These committees numbered 13 at the end of 1932 as against 5 in the previous year. They included public spirited men of all shades of opinion, members of the education and public health departments and non-officials interested in the welfare of the people in general and in the anti-tuberculosis campaign in particular. Every committee vigorously pursued an anti-tuberculosis educational campaign by means of lectures, demonstrations and distribution of literature; some also carried out other schemes having a bearing on the problem of tuberculosis in India. The Organising Secretary of the Fund undertook a number of lecture tours. An educational film demonstrating the causes of tuberculosis and means of prevention was prepared at headquarters.

#### **The St. John Ambulance Association (Indian Council) and the St. John Ambulance Brigade Overseas.**

219. During the year financial depression continued to operate, but in spite of this handicap educational work of every description advanced satisfactorily. A total of 8,576 students were trained in the Mackenzie school course in first-aid hygiene and sanitation which number represents nearly a 100% increase over 1931. 23,194 persons attended 1,311 courses of instruction in first-aid, home nursing, home hygiene and sanitation and of these 14,260 received the Association's awards.

An outstanding feature was the revival of the all-India Ambulance competitions after a lapse of 2 years.

Military forces, railways, police, prisons and reformatory schools, educational institutions, mines and industrial establishments, both in British India and Indian States, availed themselves of the services of the Association in organizing training classes in one or other of the various subjects taught under its auspices, first-aid courses attracting the largest numbers.

The Association published its own text-books in English and in the vernaculars. The Association's stores depôt at Lahore, which stocks books, appliances and first-aid equipment, sold 18,373 text-books, or 5,000 more than in 1931.

*The St. John Ambulance Brigade Overseas for the Empire of India.*—At the end of 1932, 50 ambulance, 10 nursing and 9 cadets divisions with a total strength of about 2,000 members were in existence. Owing to the resumption of the civil disobedience movement in the early months and to communal

attention to the vast problem of improving health conditions in the villages.

No general "Red Cross Week" was held as the prevailing economic conditions were not favourable.

The Society continued to give assistance to ex-soldiers invalided from the army with chronic diseases such as tuberculosis and diabetes.

*Membership Statistics.*—The adult membership statistics for the year make rather gloomy reading, as the Society inevitably suffered from the economic depression which severely affected all voluntary organisations. The total adult membership at the end of the year was 13,373 as compared with 16,032 at the end of 1931.

The Junior Red Cross membership statistics present a more encouraging picture for they show an increase of groups from 2,962 to 3,781 and of members from 152,734 to 192,516. These increases are largely due to the hearty support accorded to the movement by educational authorities all over India, who recognize in it a powerful auxiliary in health education. The Punjab still leads in such work and has a network of school groups all over the province, whilst the U. P. made splendid progress both in increasing their membership by almost cent per cent and in carrying health activities into the villages.

*Red Cross Dépôt.*—For reasons of economy, steps were taken by the Society to reduce stocks and to close down the medical stores section of the dépôt, thus restricting the dépôt transactions to the distribution of propaganda material issued by the Red Cross, the Maternity and Child Welfare Bureau, King George's Thanksgiving (Anti-Tuberculosis) Fund, and B. E. L. R. A. Hospital comforts valued at Rs. 36,183 were issued by the dépôt to 223 institutions. In addition, the dépôt also distributed literature worth Rs. 10,577 in the form of pamphlets, posters, slides, plays, lectures, etc., the most popular posters being the "Elements of Hygiene" and "Safety First." All the Junior Red Cross literature was in great demand, especially the new "Height and Weight Cards".

*The Red Cross Journal.*—The Society's quarterly journal "The Red Cross" which is jointly edited by the Organising Secretary of the Society and by Dr. Ruth Young had another successful year, subscribers numbering 602. The Junior Red Cross and the pictorial supplements appeared regularly and were very popular.

*Maternity and Child Welfare Bureau.*—During 1932 the Bureau proved an unqualified success. That success was without doubt largely due to the energy and personality of the Director, who succeeded to a remarkable degree in gaining the confidence and the affection of child welfare workers all over India. The problems with which the Director had to deal were many and varied but she never lost her grasp of essentials and in the midst of day-to-day details always found time to look to the future and to plan new advances.

A striking development of army child welfare work for sepoys' wives and families was reported. Another nursery school was opened during the year. The lack of schools of this kind in India is regrettable but is largely attributable to shortage of funds and trained workers. The burden of maintaining child welfare centres is borne mainly by the provincial branches, which

## SECTION XI

## INDIAN VOLUNTARY HEALTH ORGANISATIONS.

**The Indian Red Cross Society.**

218. During the year there were signs of a considerable awakening of Red Cross activity in Indian States. In British India such activity was specially marked in the U. P., where 11 new district branches were formed and much good work was accomplished in the schools ; in Sind where district maternity and child welfare work was being developed in spite of handicaps ; in Assam, where the membership jumped from 12 to 413 ; in Madras, where the health school was reopened and district work reorganised ; and in Bombay, where the substantial sum of Rs. 13,000 was added to the funds. Among the smaller branches of the Society, Baluchistan and Delhi did particularly well, the former in arranging popular health lectures and the latter in organising medical inspection of school children.

The Society decided to open a cinema production section at headquarters but this scheme could not be carried through although a half-time cinematograph worker was employed.

With the combined support of the U. P. Public Health Department, the Rockefeller Foundation and the Maternity and Child Welfare Section of the U. P. Red Cross, an interesting experiment was started by the Society at Partabgarh, U. P., where a "Health Unit" covering an area of about 60 square miles was organised as a demonstration of the possibilities of intensive public health work. A progressive scheme covering a five-year period was launched ; the Red Cross assisted in the organisation and financing of child welfare centres in this area ; and Junior Red Cross groups in schools also participated in the campaign for better health.

A considerable proportion of the Red Cross Society's income continued to be spent on assistance to hospitals, either in the form of medical comforts or of supplementing nursing staffs. Hundreds of institutions all over India were in regular receipt of medical comforts. Now that the government grants in many places have been reduced, there was a growing tendency to turn to the Red Cross for financial help but this unfortunately could not invariably be given. Several branches of the Society encouraged the training of nurses by offering scholarships.

In spite of the clouds of financial depression which still hung heavy about the Society, satisfactory progress was made during 1932 in all branches of Red Cross work. The opening of a number of new district and sub-divisional branches indicated that the Society had at last really got into the rural areas and the Junior Red Cross groups in village schools proved valuable allies in this work. Many of the district branches of the Society have given serious

---

U. P. . . . .	United Provinces.
B. & O. . . . .	Bihar and Orissa.
B. E. L. R. A. . . . .	British Empire Leprosy Relief Association.
D. P. H. . . . .	Director of Public Health.

### Conclusion.

217. As in last year's report, the outstanding feature of this summary for 1932 is the continued overcrowding in a large number of the provincial jails. From the figures recorded, it is clear that the medical officers and Inspectors General responsible for the health of the jail populations have devoted great care to the many sanitary problems which overcrowded institutions inevitably present. The general death rate has fallen to the remarkably low figure of 11.2 p. m., a figure which is in very marked contrast to that applicable to the general population of the country as a whole. That such a low death rate was possible of attainment in the circumstances reflects the greatest credit on all concerned.

It is also to be noted that the major epidemic diseases of India, *viz.*, cholera, smallpox and plague, were practically non-existent throughout the year, and although there was a concomitant marked decrease in the incidence of these diseases among the general population, their general absence from jails must be attributed to the assiduous and successful preventive work carried out by those in charge of institutions. This is a recurring feature of jail administration in this country which might well be noted by those engaged in general public health work. The lesson is obvious.



Malaria was mostly confined to locally convicted prisoners and declined from 5,219 admissions in 1930 and 3,334 in 1931 to 1,803 in 1932. This was no doubt due to the energetic preventive measures taken which included quinine prophylaxis.

Cholera was absent.

Dysentery caused 67 admissions, the lowest figure for the last 7 years. Improved water supply and segregation are said to have lowered the incidence of this disease.

Enteric fever was responsible for 29 cases,—11 among convicts and 18 among the free population. The “free” cases were probably due to infection by carriers. Disinfection of water-supplies and improvements in sanitation prevented further spread of the disease.

25 admissions and 8 deaths were recorded from Weil’s disease, as compared with 47 and 10, respectively, in 1931. 260 cases of yaws were treated in the Nicobars and 6 cases were given anti-syphilitic treatment.

A mild outbreak of influenza occurred in the Nicobars in August but it quickly subsided. Seven cases in the cellular jail and 17 among the military police were recorded in Port Blair.

Tuberculosis was the cause of 18 admissions and 11 deaths; pneumonia 59 and 22; and diarrhoea 39 and 2, respectively.

Other infectious diseases included 2 cases of diphtheria, 8 of measles and 3 of chicken-pox.

One case of filariasis occurred in the jail and in order to prevent the spread of this disease, the patient was transferred to India.

The comparative sick and mortality rates amongst self-supporters, who are mainly cultivators living in outlying villages, and the labouring convicts are compared in Table X (vi).

TABLE X (vi).

Year.	Daily Sick Rate p. m.		Death Rate p. m.	
	Labouring convicts.	Self supporters.	Labouring convicts.	Self supporters.
1928 . . . . .	22.6	24.3	0.9	12.0
1929 . . . . .	33.5	29.6	14.0	17.7
1930 . . . . .	43.1	56.0	16.3	54.7
1931 . . . . .	25.8	49.2	7.1	35.3
1932 . . . . .	20.8	31.2	3.1	41.4

Noticeable improvement was made in the general sanitation of the settlement, and sources of drinking water, the food supply and the disposal of night soil were under constant supervision. Water supplies of most of the villages were, however, unsatisfactory.

The supply of fish and other food-stuffs was adequate; that of milk was as usual satisfactory except for a short period when the supply was supplemented from local contractors.

seem to point to greater attention being paid to details of diet and to the early treatment of mild cases. The numbers of admissions and deaths due to dysentery were 389 and 21, respectively. Of the 108 admissions and 56 deaths from tubercular diseases, 100 and 49, respectively, were due to pulmonary tuberculosis. In the tubercular ward at Myingyan, which has accommodation for 50 prisoners, 44 cases were admitted during 1932; 19 of these died, 4 within 1 month, 3 within 2 months and 12 after 3 months of admission.

Quinine was issued to those with a history of malaria, the admissions and deaths from this cause being 473 and 10, respectively.

Enteric fever was responsible for 52 admissions with 9 deaths. All new admissions, during the period of segregation, were inoculated with T. A. B. vaccine. There were 18 admissions with 2 deaths from beri-beri. As regards the treatment of this disease, the remarks of the Superintendent, Mandalay jail, are interesting as they show an important departure from the usual routine of feeding the patient on diet, rich in Vitamin B. He reports cases in which hypodermic injections of adrenalin chloride (1 in 1,000) in small doses of between 3 to 8 minims, 2 or 3 times a week, produced remarkable improvement in patients who otherwise appeared to be going downhill rapidly. He states "with the very first injection the condition of the patient improved, general anasarca getting less and less. After 8 injections the oedema completely disappeared and the heart became normal . . . . It was also noted that with the injection of adrenalin the temperature, which was hitherto below normal, rose and became stationary. It will be seen that beri-beri may be successfully treated with adrenalin and a salt free diet".

The incidence of influenza was relatively mild; only 475 cases with 2 deaths were recorded.

Ankylostomiasis accounted for 1,346 cases and 2 deaths. New admissions were, as usual, given a routine examination for ankylostoma infection.

6.1% of the convict population were opium addicts.

Classes of instruction in first-aid were held in the jails at Akyab, Insein, Bassein, Thayetmyo, Myingyan, Paungde, Toungoo and Meiktila.

216. *Andamans*.—The total jail population numbered 7,304 males and 119 females as against 10,271 and 168, respectively, in 1931. The barracks, allowing 50 superficial feet per prisoner, had accommodation for a total of 3,461 (3,401 males and 60 females)—2,659 males in the settlement and 742 males and 60 females in the jail district. The maximum population confined on any one day was 7,841—male 7,711 and female 130. A hospital for women and children was opened at Atlanta Point in February, 1932.

A total of 3,865 admissions to hospital was recorded with 172 deaths. The average sick rate *per mille* was 38.6 and the death rate 40.1.

But for a mild outbreak of influenza in the Nicobar Islands in August, no serious epidemic disease occurred and the year was comparatively healthy.

of this disease can be controlled successfully. The rise in the malarial incidence was attributed to the discontinuance of quinine prophylaxis and to the prevalence of the disease in the civil population during the previous year.

Of the 31 admissions and 11 deaths recorded from pulmonary tuberculosis, 8 and 5 respectively occurred in Sylhet jail; the same jail also recorded the highest incidence of diarrhoea.

Damp and ill-ventilated barracks were improved, where necessary, in an attempt to lower the incidence of pneumonia.

Hookworm investigation was systematically carried out in every jail; of the 22 cases treated, most of whom were heavily infected at the time of admission, 2 died.

Owing to the lower prices of food-stuffs, dietary charges per head fell from Rs. 44-14-8 in 1931 to Rs. 37-2-6; hospital charges fell from Rs. 201-8-0 to Rs. 156-11-8 and the clothing and bedding charges from Rs. 6-2-2 to Rs. 4-7-10. Sanitation charges showed a slight increase.

215. *Burma*.—During 1932, there were 9 central, 18 district, 2 camp and 5 subsidiary jails, these providing accommodation for 22,379 prisoners. Owing to financial stringency, the construction of the proposed subsidiary jail for the Pegu district and the tubercular and leper jails at Meiktila were again held in abeyance; the combined Borstal and Senior Training School at Thayetmyo continued to function.

Dietary, clothing and bedding, sanitation and hospital charges all were lower than in the previous year.

Chlorination of jail water supplies was carried out as usual; as regards conservancy, the dry earth system was in use. Prisoners were examined physically before being passed for labour and those found to be losing weight were kept under close observation until they regained normal weight.

All new direct admissions, both convicts and undertrials, were immediately vaccinated; total vaccinations numbered 45,836—primary 2,713 and revaccinations 43,123.

Despite serious overcrowding in many of the jails, the daily average strength showed a slight increase and the admission, daily sick and death rates *per mille* fell from 394.5, 15.2 and 12.9 in 1931 to 312.4, 11.4 and 11.1, respectively.

The number of deaths decreased by nearly 8%. Of the 241 prisoners who died, 85 were admitted to jail in good health, 59 in bad health, and 97 in indifferent health. Of these 46 died within a week of admission; 9 within 2 weeks; 1 within 4 weeks; and 188 after more than a month. 14 deaths occurred among prisoners, who on admission were sent direct to hospital. 132 deaths occurred amongst prisoners who were between 16 and 40 years of age, 99 between 40 and 60 years, 1 under 12 years and 9 amongst those over 60 years of age.

Cholera was again absent, and only 2 deaths from plague were recorded.

The improvement in the incidence of and mortality from dysentery was again remarkable and was ascribed chiefly to the efficient chlorination of drinking water. This, together with the fall in the figure for diarrhoea, would

prisoners. Pneumonia cases were generally recorded, there being a total of 55 admissions from this disease.

Although registration of cases of diarrhoea is discouraged, as it is only a symptom, 21 admissions due to this cause were recorded.

Ankylostomiasis was responsible for 43 admissions. Prisoners on admission were given a routine anthelmintic course unless this was otherwise contra-indicated. Faecal examinations were discontinued.

Enteric cases rose from 27 to 32, Cannanore and Trichinopoly jails accounting for 8 each.

Syphilis cases further dropped to 47, of which 12 were in Madura and 10 in Trichinopoly.

Protected water supplies were in use in all the central and district jails and Borstal schools, and the conservancy system was as up-to-date as possible. Drainage received attention.

The quinine section of Madras Penitentiary jail yielded a profit of Rs. 7,620 as against Rs. 9,820 in 1931.

Of the 18,438 prisoners released, the discharged prisoners aid society was able to render help to 814 only.

213. *Coorg*.—This report, as usual, contained considerable information of value and interest.

214. *Assam*.—Available accommodation provided for 3,873 prisoners as against 3,549 in 1931, and the I. G. of Prisons considers this still insufficient for all purposes and quite inadequate to cope with emergencies. Cellular accommodation is practically non-existent.

In spite of an increased population due to the civil disobedience movement, consequent overcrowding, and the admission of many prisoners in bad or indifferent health, coupled with inadequate provision for segregation and isolation, the admission, the daily average sick and the death rate all remained lower than in the previous year, being 602.2, 27.9 and 16.8 p. m. as against 653.2, 33.3 and 19.8 p. m. in 1931. These figures reflect great credit on the provincial jail and administrative staffs.

The mortality rate, which is said to be the highest in British India, at least compares favourably with the provincial death rate of 19.0 p. m.

The percentages of prisoners of all classes admitted in good, indifferent and bad health were 52, 39 and 9 respectively as compared with 53, 39 and 8 in the previous year.

In the Assam valley jails 18.2% of the convicts were habitual drug addicts and in the Surma valley 4.4%.

Malaria (527) and dysentery (337) were the main causes of sickness; deaths included dysentery (15) pneumonia (15) and pulmonary tuberculosis (11). The incidence of dysentery was highest in Gauhati (133 cases) and of malaria in Jorhat (123). Dysentery is rampant in the Assam jails and is said to be of extraneous origin. This state of affairs will continue so long as cellular accommodation is not available for the segregation of new admissions, as isolation and treatment are the only effective measures by which the incidence

Malaria was the cause of 2,369 admissions and only 1 death, influenza 154 and 1 and pneumonia 191 and 31. 1,439 admissions and 5 deaths were recorded from dysentery and diarrhoea.

Quinine tablets continued to be manufactured at Yeravda central prison.

Catarrhal jaundice accounted for 105 cases. There was an outbreak of epidemic catarrhal jaundice in the Ahmedabad central jail, a total of 63 cases with 1 death being recorded.

Prisoners' aid societies continued to help ex-prisoners at Bombay, Ahmedabad, Bijapur and Poona.

Dieting charges per head fell from Rs. 39-13-4 to Rs. 37-4-8, hospital charges from Rs. 166-6-1 to Rs. 120-1-9, and sanitation charges from Rs. 5-6-10 to Rs. 4-8-10, whilst clothing and bedding charges rose from Rs. 4-5-10 to Rs. 5-2-3.

212. *Madras*.—The 9 central, 2 borstal, 3 special and 3 district jails and 300 sub-jails had accommodation for 25,096 prisoners (23,127 male and 1,969 female) as against 25,340 (23,303 male and 2,037 female) in the previous year. Owing to the release of a large number of Mapilla rebellion prisoners, the Allipuram central jail was abolished as a measure of economy; 16 sub-jails were also closed whilst a sub-jail was opened at Virudhunagar.

The improvement in health conditions was marked and notwithstanding an increased daily average population of 16,475 as against 15,683 in 1931, there was an appreciable fall in the number of admissions to hospital, in the daily average sick and in deaths, *viz.*, from 6,935, 341.0 and 145 respectively in 1931 to 6,073, 269.1 and 117. The death rate fell from 9.4 p. m. to 7.2 the lowest on record since 1895. Of the deaths, 14 occurred in the Trichinopoly central jail, 12 in the Wellesley sanatorium jail, Bellary, the latter ascribed to pulmonary tuberculosis; 11 each in the Madras Penitentiary and Cannanore central, 10 each in Coimbatore and Salem central jails, 8 in Rajahmundry central and the remaining 41 in other institutions including sub-jails. 14 convicts including 4 Mapillas were repatriated from the Andamans.

Cholera was again absent. Dysentery caused 551 admissions, the Cannanore and Bellary central jails accounting for 107.

The number of admissions from malaria dropped from 352 to 167 or slightly less than half, but noticeable increases were recorded in the Bellary central and Madras Penitentiary jails.

The number of admissions from pulmonary tuberculosis fell from 164 to 83. The presence of this disease was recorded in nearly all the jails. Of the 19 deaths ascribed to this disease, 12 occurred in the Wellesley sanatorium jail, which is especially used for segregation and treatment of tubercular prisoners from other parts of the Presidency.

Of the 92 admissions from anæmia and debility 26 were reported from the Trichinopoly central jail among the civil disobedience movement

Dietary, clothing and bedding and hospital and sanitation charges all fell.

211. *Bombay*.—Owing to trade depression in general and to the recurrence of the civil disobedience movement during 1932, the average daily population rose from 14,864 to 19,100. The excess population was provided by opening temporary camp jails at Yeravda, Visapur, Worli, Ahmedabad and Nasik Road, which increased the total accommodation from 20,496 in 1931 to 23,186. Plans and estimates for new sub-jails at Ahmedabad, Nawabshah and an extension of the sub-jail at Larkana were technically approved.

Table X(v) shows the jails where the daily average population exceeded the total available accommodation :—

TABLE X(v).

	Sanctioned accommodation.	Daily average population.
H. M.'s House of Correction . . . . .	244	271
Dhulia district . . . . .	538	677
Belgaum central . . . . .	1,004	1,361
Bijapur district . . . . .	345	465
Karwar district . . . . .	168	246
Thana district . . . . .	689	745
Ahmedabad central . . . . .	1,261	1,683
Hyderabad central . . . . .	1,526	1,689
Shikarpur special . . . . .	464	523

The admission and the daily average sick rates, as was to be expected, showed an increase from 628.4 and 16.9 p. m. respectively to 647.2 and 19.8 p. m. On the other hand, the death rate fell from 10.7 p. m. to 7.1 p. m. and was the lowest in the whole of British India. Shikarpur special prison (22.9 p. m.) again recorded the highest rate.

Although cholera and plague prevailed in several districts, the prison population remained entirely free. Prophylactic inoculations were carried out where necessary.

Cerebro-spinal meningitis was responsible for 10 admissions and 9 deaths—7 admissions with 6 deaths in the Shikarpur special prison, 2 fatal cases in the Sind convict gang and 1 fatal case in the Khankot sub-jail in the Upper Sind Frontier district.

Of the 74 admissions with 5 deaths from enteric fever, 29 and 4 respectively were recorded in the Visapur temporary prison, where an epidemic of the explosive type occurred. The outbreak was traced to carriers among the prisoners who had been handling food and water. Mass (T. A. B.) inoculation and strict isolation of all prisoners giving a definite previous history of typhoid or a like fever were carried out.

62 admissions and 14 deaths were ascribed to tuberculosis as against 46 and 19 in 1931.

(3.5), Bogra (4.9), Presidency (6.0), Jessore (6.4), Comilla (6.5), Hooghly (8.1) and Burdwan (8.2) had low rates.

Cholera was responsible for 6 admissions and 1 death as against *nil* in 1931.

Malarial fever caused 7,147 admissions and 15 deaths, dysentery 1,343 and 10; diarrhoea 2,264 and 3; and abscess, ulcer and boil 1,154 and 1. Anæmia and debility were responsible for 735 cases and 16 deaths; pneumonia 175 and 25; and pulmonary tuberculosis 110 and 21.

The Dacca, Hijli special, Dum Dum, Midnapore, Rangpur and Barisal jails reported the largest numbers of dysentery cases; the jails at Alipore, Comilla, Jessore, Midnapore, Mymensingh, Krishnagar and Jalpaiguri recorded high admission rates for malaria.

The manufacturing section of the Presidency jail issued 45,152 lbs. of quinine and cinchona in addition to 91,274 boxes of quinine treatments, as against 38,560 lbs. and 82,694 boxes in 1931. The sale-proceeds of quinine tablets and treatments and other cinchona products amounted to Rs. 7,59,186.

210. *Central Provinces*.—Total accommodation, excluding hospitals and observation cells, provided for 6,518 prisoners as against 6,418 in 1931. Owing to the influx of civil disobedience prisoners, the daily average prison population rose from 4,848 to 5,665. The excess population was concentrated in Amraoti and in special jails.

Many of the civil disobedience prisoners came from amongst the unemployed and youthful elements of the population and the majority were below the average in physique. Chronic infections were common, particularly venereal disease. In consequence the number of admissions to hospital rose from 1,665 to 1,866 and the daily average sick from 61.53 to 62.09. The appreciable fall in the total number of deaths and the death rate from 84 and 17.3 p. m. to 46 and 8.1 p. m. (the lowest on record) was therefore particularly pleasing. In this connection the I. G. of Prisons remarks:—

“A very noticeable feature of the stay in jail of civil disobedience prisoners is the remarkable improvement in health that the large majority show. This fact is probably due to the better feeding, better housing, better discipline and more regular hours that these young men enjoy in jail and to the enforcement of more healthful and sanitary habits in general.”

Cholera was absent. Of the 189 admissions for dysentery, 47 occurred in the Akola district jail, 44 in Raipur and 29 in Jubbulpore. Malaria caused 320 admissions, 101 being in Jubbulpore central jail alone.

Pulmonary tuberculosis was responsible for 41 admissions with 5 deaths of which 20 and 3 respectively were in Chhindwara where tubercular patients from other institutions in the province are concentrated. 32 admissions were ascribed to pneumonia (47 in 1931) and 98 to other respiratory diseases.

28 cases of leprosy were treated, of whom 3 are said to have been apparently cured and many of the remaining 25 cases showed definite improvement. Two released patients were treated in the small leper home built recently on the jail lands.

The discharged prisoners' aid society continued to work successfully undeterred by reduced finances.

hookworm infection was continued, and out of 18,122 examined 7,966 or 44% were found positive as against 53% in 1931.

Of the 86 admissions and 31 deaths from pulmonary tuberculosis 23 and 9 respectively occurred in the Bhagalpur central jail and 17 and 6 in Buxar. The number of influenza cases fell from 788 to 341. Pneumonia accounted for 185 admissions and 29 deaths; of these Patna camp jail reported 74 and 10 respectively. The number of admissions to hospital from "other respiratory diseases" increased from 470 to 673, the Patna camp jail alone recording 377. The number of deaths fell from 8 to 5.

Leprosy cases were segregated in the Muzaffarpur district jail. Five leper prisoners were put on a special experimental dietetic treatment without medicines, whilst another group of 5 control cases were kept on ordinary jail diet with drugs. The results of this investigation will be anticipated with interest. The daily average number of lepers was 36·8.

The dietary and sanitation charges per head fell from Rs. 38-1-0 and Rs. 2-15-0 to Rs. 34-13-0 and Rs. 2-9-0 respectively; the hospital and bedding and clothing charges rose from Rs. 214-7-0 and Rs. 6-2-0 to Rs. 224-14-0 and Rs. 7-12-0.

209. *Bengal*.—Owing to the renewal of the civil disobedience movement early in 1932, a large increase in the jail population occurred and the excess population was provided in additional temporary jails at Dum Dum, Hijli and Berhampore. The number of ordinary convicts also increased considerably.

Total accommodation, excluding hospital and observation cells, existed for 18,999 prisoners (males 18,162, females 837), whilst the average daily strength was 22,618 (males 22,244 and females 374). The maximum population confined on any one day was 31,924 (31,681 males and 990 females). In order to relieve overcrowding, additional accommodation was provided for female prisoners in the special jail at Berhampore.

In the Borstal school, Bankura, attention was paid to games and to physical culture.

Expenditure on jail buildings amounted to Rs. 1,17,808 for original works. The Bengal after-care association continued to do useful work.

Dietary charges per head declined from Rs. 54-4-0 to Rs. 48-6-0, hospital charges from Rs. 240-15-0 to Rs. 204-14-0. The clothing and bedding charges rose from Rs. 6-11-0 to Rs. 7-10-0 and sanitary charges from Rs. 3-8-0 to Rs. 3-13-0 per head.

Admission and sick rates *per mille* rose from 980·6 and 35·1 in 1931 to 1,427·8 and 41·3, respectively, whilst the death rate, despite 22 deaths in Mymensingh jail owing to a tornado, decreased from 11·5 to 10·5. The death rate was the second lowest on record but it must be remembered that the decrease was due to some extent to the release of many prisoners who were in poor health during the previous 3 years, this step being taken in order to relieve overcrowding. Jalpaiguri (21·7), Barisal (21·7), Rangpur (21·3) and Chittagong jails (19·0) recorded the highest death rates; Berhampore



were in bad health and in an advanced stage of the disease. In June, 1932, the usual injection treatment was supplemented by iodized ethyl esters of hydnocarpus oil obtained from the Naini leper asylum. All of the 45 prisoners who received injections showed improvement.

Government sanctioned allotments to the value of Rs. 13,766 for re-roofing, Rs. 4,596 for latrines, and Rs. 6,497 for water supplies. An infectious diseases ward was built in the Allahabad district jail. Drainage received attention. The local maternity and child welfare centres agreed to depute midwives to attend maternity cases among female convicts. This is a step in the right direction. The discharged prisoners aid society expended Rs. 3,535 during the year.

Dietary and hospital charges per head fell from Rs. 28-2-7 and Rs. 112-15-2 to Rs. 26-8-3 and Rs. 99-4-0 respectively; whilst clothing and bedding and sanitation charges rose from Rs. 3-3-1 and Rs. 1-6-8 to Rs. 3-12-10 and Rs. 1-9-10.

208. *Bihar and Orissa*.—The number of permanent jails and sub-jails was the same as in the previous year; but to relieve serious overcrowding resulting from the civil disobedience movement and from increased crime, the camp jail at Patna was reopened, the jails at Arrah and Chaibassa were maintained as district jails and the sub-jails at Balasore and Daltonganj were temporarily raised to the status of district jails. The temporary sub-jail at Gulzarbagh was opened in February and closed towards the end of the year. Overcrowding was relieved also by releasing 1,411 prisoners either not convicted of any serious offence or physically unfit to commit further crime owing to old age or infirmity. In addition, 1,168 boys of 17 years of age or under, convicted under the Criminal Law Amendment Act or the Ordinances, were released. Notwithstanding the rise in the daily average population from 11,319 to 14,378, the highest figure since the formation of the province in 1912, the health record was said to be satisfactory on the whole. Whilst the admission rate rose from 641·2 in 1931 to 733·6, the total number of deaths from all causes, the death and the daily average sick rates *per mille* were only 180, 12·5 and 30·6 respectively as compared with 212, 18·6 and 31·7 in 1931. The central jail at Bhagalpur (35) and the camp jail at Patna (30) reported the largest numbers of deaths.

Dumka (37·4), Puri (27·0), Purulia (23·8), Ranchi (19·5), Purnea (19·2), Bhagalpur (17·4) and Motihari (16·9) returned the highest death rates.

Of a total of 6 admissions and 3 deaths from cholera, Gaya central jail had 4 cases with 3 deaths and Motihari 2 cases.

Dysentery caused 1,942 admissions; malaria 2,229 and diarrhoea 708. The increase in the incidence of these diseases was due to the fact that many civil disobedience movement prisoners were mere beggars and vagrants of poor physique and stamina and harbouring infection on admission. In most jails, prophylactic treatment with cinchona febrifuge was carried out with satisfactory results.

Ankylostomiasis was the cause of 626 admissions and 11 deaths. The Patna camp jail reported most of these cases and the Bhagalpur central most of the deaths. The examination of newly admitted prisoners for

The dietary charges per head fell from Rs. 25-11-2 to Rs. 25-8-6; the hospital charges from Rs. 214-10-11 to Rs. 127-13-9; the clothing and bedding charges from Rs. 20-3-5 to Rs. 13-12-6; and the sanitation charges from Rs. 3-7-4 to Rs. 3-1-4.

The activities of the Punjab prisoners aid society were well maintained. Scouting, games and recreation continued to be encouraged.

A female sub-assistant surgeon was added to the staff of the Lahore female jail.

207. *United Provinces.*—The year under review was a very difficult one from the administrative point of view as, owing to the civil disobedience movement, the daily average population of the 56 jails, with an available accommodation for 36,552, reached the record figure of 36,703. The highest population on any one day was 37,254 in March, 1932. Overcrowding, which was generally prevalent, was alleviated by opening the camp jail at Lucknow and by releasing 1,851 convicts.

Special female accommodation is now provided in the Lucknow, Benares and Fatehgarh central jails. The juvenile jail at Bareilly continued to be run on a modified Borstal system.

It is gratifying to note that in spite of the serious and unprecedented overcrowding, the health of the prison population remained satisfactory throughout the year. Whilst the daily average sick rate rose slightly from 20.3 to 21.2 p. m. and the number of admissions from 17,441 to 19,737 owing to the prevalence of influenza and mumps in some jails, the admission rate, the number of deaths and the death rate fell from 542.5, 353 and 10.9 to 537.7, 341 and 9.2 p. m., respectively. The death rate would have been still lower but for 41 deaths from heatstroke as compared with 24 in the previous year. A malarial survey of the district jail at Allahabad was carried out. Whilst the recommendations of the Public Health Department regarding prophylaxis treatment, etc.,—based on the survey of the Lucknow central jail in 1931 which was referred to in last year's report,—were commended to the notice of all the jails, the low incidence of malaria during 1932 was probably mainly due to the lesser prevalence of the disease in the province as a whole.

Those institutions which especially contributed to the high death rate were Agra, Benares and Allahabad central and Agra and Benares district jails, whilst Almora, Dehra Dun, Ballia, Pilibhit and Pauri jails presented clean bills of mortality.

The principal causes of sickness were malaria 4,564 admissions, abscess, ulcer and boil 2,064, other respiratory diseases 862, dysentery 615, diarrhoea 494, pneumonia 391, tuberculosis 308, anæmia and debility 202 and cholera 5. 85 deaths were ascribed to pneumonia, 41 to tuberculosis, 17 to dysentery, 13 to malaria, 8 to anæmia and debility, 7 each to "other respiratory diseases" and "diarrhoea" and 2 to abscess, ulcers and boils. Plague was absent. Of the 227 cases treated in the tubercular jail at Sultanpur, 25 died, 12 were cured while 44 incurable cases were released.

Leprosy cases were, as usual, concentrated in the Rai Bareilly district jail, the total admissions numbering 152 with 3 deaths. Most of the admissions

31,505 in 1931. As in the previous year, the overflow was accommodated in tents, camps, etc.

Despite overcrowding, the admission, the daily average sick and the death rates fell from 917 p. m., 29 p. m. and 12.6 p. m. respectively in 1931 to 785, 21 and 12.3. The death rate would have been still lower but for the outbreak of cerebro-spinal fever in the Lahore Borstal institution which caused 11 deaths. The Lahore female jail headed the list of mortality rates (22.4 p. m.) due to the confinement of a number of old and decrepit women. Other death rates were Lahore Borstal (21.1), Multan central, new (20.5), D. G. Khan (18.7), Ambala (17.5), Lahore central (15.8), Multan central, old (15.5), Gurdaspur (15.1), Montgomery central (15.0) and Ferozepore (12.5).

The most important feature of the jail health conditions was the introduction (probably by the *Ahriar* prisoners transferred from Kashmir jails) of cerebro-spinal fever into the Lahore Borstal institution, which caused 24 admissions with 11 deaths. Although the spread of this disease was arrested by organised preventive measures, the organism was still being found in the throats of apparently healthy carriers and the latest reports show that 18% of all those examined were carrying the germ.

Malarial fever, abscess, other respiratory diseases and dysentery were the chief causes of sickness. Pneumonia (280 admissions and 83 deaths) and tuberculosis (145 and 49, respectively) continued to be the most fatal diseases; and special efforts were made to combat their high incidence. Malaria caused 5,434 admissions with 11 deaths as against 6,922 and 21, respectively in 1931. Rawalpindi jail recorded the highest number of admissions and Multan central (old) the highest number of deaths. Prophylactic quinine was issued regularly during the malarial season.

Six admissions and 2 deaths from cholera were recorded in the Rawalpindi jail in August, the infection being imported by a prisoner from the N. W. F. P. Smallpox was the cause of 6 cases. The municipal vaccinator performed 7,475 revaccinations in the Lahore central jail alone.

Enteric fever accounted for 61 admissions and 8 deaths.

The number of admissions from dysentery increased from 553 to 654, Montgomery central jail alone recording 100 admissions. Admissions from diarrhoea fell from 470 to 396 and from influenza from 969 to 244.

Five cases of leprosy were admitted in the special ward at the Mianwali jail, while 20 convicts were transferred to the Punjab mental hospital as insane.

The drainage scheme for the disposal of the sullage of the Lahore jails was continued. Other works of similar nature which were carried out during the year included (a) additions and alterations to the pumping plant at Rawalpindi; (b) sanitary installation and the reconstruction of the water supply at the Attock camp, Lahore Borstal, and other jails; (c) tube-wells at the Mianwali district jail and the Lahore Borstal institution. The health division of the Public Works Department spent Rs. 1,25,177 on these and other sanitary works.

The Andamans continues to head the "lost weight" list, followed by Bombay, B. & O. and Bengal. Increases in the percentage of those who gained weight were recorded in Coorg (+12.3), C. P. (+8.0), B. & O. (+5.6), N. W. F. P. (+3.9), Bengal (+2.1), U. P. (+1.4) and Madras (+0.1); while decreases occurred in Bombay (-2.9), Assam (-1.6) and Burma (-0.2).

In the Madras Presidency, Cuddalore jail recorded the highest percentage of those who lost weight (35.1%), followed by Bellary (14.5%) and Berhampore (13.7%), whilst the Borstal school, Palamcottah, returned the lowest percentage (1.1%).

### Remarks on individual Provinces.

205. *N. W. F. P.*—In paragraph 205 of this section for 1931 brief reference was made to the serious overcrowding in the jails of this province. Early in 1932, the state of overcrowding was worse than ever due to increase of the Red Shirt Movement prisoners in the preceding December. It is to the credit of the provincial jail administration that the situation was managed so satisfactorily. Excluding hospital and observation cells, the total accommodation in the 3 central and 3 district jails provided for 5,051 prisoners (4,988 in 1931), whilst the maximum number under confinement on any one day was 10,650 (7,700 in 1931); and the daily average strength was 7,927 (5,257 in 1931). Including the 9 lock-ups, the daily average population which was 5,725 in 1931 rose to 8,466 in 1932, an increase of 2,741. Many of these political prisoners on admission to the jail were found to be in bad or indifferent health and were responsible for the high malarial incidence during the year.

In these circumstances it is not surprising to find that the admission to hospital rate rose from 475 p.m. in 1931 to 733, due in great part to admissions into the Kohat jail. On the other hand, the increase in the daily average sick was slight, *viz.*, from 30 p. m. in 1931 to 32, whilst the death rate actually declined from 12.2 p. m. to 11.4.

Total admissions numbered 5,170 (2,201 in 1931) and deaths 80 (50 in 1931). Of the admissions, malaria caused 1,884 as compared with 658 in 1931, pneumonia 303, diarrhoea 264, dysentery 103, pulmonary tuberculosis 39 and other tubercular disease 28.

Of the deaths 42 were due to pneumonia, 16 to pulmonary tuberculosis, 6 to other tubercular disease, 3 to malaria and 1 to dysentery. The increase in the incidence of and mortality from pneumonia was ascribed to the bad or indifferent health of many prisoners on admission.

Dietary and sanitation charges per head rose from Rs. 31-4-1 and Rs. 1-6-9 to Rs. 32-2-0 and Rs. 2-0-3 respectively, whilst the hospital charges declined from Rs. 233-4-2 to Rs. 185-1-5 and the clothing and bedding charges were Rs. 13-9-2 as compared with Rs. 13-9-10 in 1931.

206. *Punjab.*—The available jail accommodation provided for 16,697 prisoners as against 16,607 in 1931, whilst the daily average strength, *viz.*, 23,058 (21,601 in 1931) was in excess of the authorised accommodation by 6,361. The maximum number confined on any one day was 30,941 as against

Provision for the segregation and treatment of tubercular patients is much the same as that recorded in previous reports.

*N. W. F. P.*—Abbottabad jail (40 beds).

*Punjab*.—Multan new central jail.

*U. P.*—Sultanpur jail.

*B. & O.*—Tubercular prisoners from north Bihar are housed in Bhagalpur jail (35 beds) and a tuberculosis ward for 12 patients exists at Buxur. Other jails where such patients are segregated for treatment include Gaya central (6 beds), Purulia district (4) and Motihari district (4).

*Bengal*.—Suri jail meets the wants of western Bengal and Comilla jail those of eastern and northern Bengal.

*C. P.*—Chhindwara jail.

*Bombay*.—Special provision for the segregation and treatment of tubercular patients exists in the central jails at Belgaum (18 beds), Yeravda (8 beds), Ahmedabad (6 cells) and Hyderabad (3 cells) and in the district jail at Karachi (3 beds).

*Madras*.—All phthisical cases, except those in advanced stages and unfit to travel, are concentrated in the Wellesley sanatorium jail, Bellary. An X-ray apparatus was said to be an urgent necessity for this institution.

*Assam*.—Long-term prisoners suffering from pulmonary tuberculosis are concentrated in Sylhet jail.

*Burma*.—The Myingyan tubercular ward has accommodation for 50 cases. Of the 51 patients treated, 19 died, 20 were discharged cured and 12 were discharged otherwise.

### Weight of Prisoners.

204. Table X (iv) shows in percentages the condition of prisoners on discharge. The table is arranged in the order of loss of weight :—

TABLE X (iv).

Provinces.		Gained weight.	Stationary.	Lost weight.
Andamans	{ Discharged from cellular jail . . . . .	47.0	25.0	28.0
	{ Discharged from settlement . . . . .	50.0	16.0	34.0
Bombay	. . . . .	50.7	26.3	23.0
Bihar and Orissa	. . . . .	54.8	29.4	15.8
Bengal	. . . . .	58.3	26.3	15.4
Assam	. . . . .	53.7	32.1	14.2
United Provinces	. . . . .	56.1	31.8	12.1
Central Provinces	. . . . .	64.0	24.0	12.0
North-West Frontier Province	. . . . .	55.7	32.7	11.6
Punjab	. . . . .	39.0	50.0	11.0
Purma	. . . . .	64.0	26.5	9.5
Madras	. . . . .	74.7	19.9	5.4
Coorg*	. . . . .	72.7	21.2	4.6

\* The weight of one prisoner who died was not recorded.

*Assam*.—Jorhat (135), Sylhet (84), Tezpur (71), Sunamganj (55), Shillong (42), Golaghat (41), Gauhati (38) and Dibrugarh (31).

*Burma*.—Mandalay (93), Tharrawaddy (52), Alon camp (40) and Toungoo (39).

Bengal and Orissa with an admission rate of 273.4 p. m. (242.2 in 1931) suffered worst, other high rates being the Upper Sub-himalayan region 257.5 against 363.5 in 1931 and 345.9 the decennial mean; North-West Frontier, Indus Valley and North Western Rajputana 244.4 against 248.2 in 1931 and 312.5 the decennial mean; the Hills 226.4 against 116.7 in 1931 and 187.5 the decennial mean; Assam 160 against 106.0 in 1931 and 114.9 the decennial mean; the Gangetic Plain and Chota Nagpur 145.8 against 167.6 in 1931 and 151.8 the decennial mean; and the Deccan 101.1 against 111.4 in 1931 and 117.8 the decennial mean. In Southern India the incidence was lowest; Burma, South-Western Rajputana, Central India and Gujerat and the Western Coast showed only mild infections.

The mortality rate, excluding the Andamans, was 0.5 p. m. (0.5 in 1931 and 0.7 the decennial mean), and including the Andamans 0.7 (0.9 in 1931 and 0.9 the decennial mean). The death rate varied between 5.1 in the Andamans and 0.2 in Bombay. No mortality from this cause was recorded in Madras.

202. *Pneumonia*.—2,060 admissions with 428 deaths were ascribed to this cause as compared with 1,718 and 408 in 1931.

N. W. F. P. continued to report the highest incidence and Madras the lowest, *viz.*; 44.3 and 4.1 p. m. respectively, as against 25.3 and 5.1 in 1931 and 21.5 and 6.9 the decennial means. Other provinces recording high incidences were—B. & O. 16.2 against 16.1 in 1931 and 10.4 the decennial mean; Punjab 14.3 against 11.7 in 1931 and 15.0 the decennial mean; Bombay 13.9 against 17.2 in 1931 and 18.2 the decennial mean; U. P. 13.2 against 12.8 in 1931 and 13.3 the decennial mean; Bengal 12.0 against 12.6 in 1931 and 10.3 the decennial mean.

The N. W. F. P. (6.3 p. m.) headed the list of mortality rates, followed by the Punjab (4.3), Assam (3.9), Andamans (3.0), U. P. (2.7), B. & O. (2.5), Bengal (2.0), Bombay (1.9), Burma (1.5) and C. P. (1.0). No mortality from this cause was reported in the Madras Presidency.

Excluding the Andamans, the admission and death rates were 12.8 and 2.6 p. m. respectively, as compared with 12.1 and 2.8 in 1931 and 11.7 and 2.6 the decennial means.

203. *Tubercle of the Lungs*.—Excluding 17 admissions and 10 deaths in the Andamans, 922 admissions and 259 deaths were registered as against 900 and 271 respectively in 1931. C. P. (9.2 p. m.) headed the list of admission rates; followed by Assam (8.9), B. & O. (7.6), U. P. (7.4), Madras (6.6), Bengal (5.9), N. W. F. P. (5.3), Punjab (4.8), Burma (4.6), Bombay (2.7) and the Andamans (2.3). The mortality rates varied as follows:—3.4 p. m. in Assam, 2.7 in B. & O., 2.3 in Burma, 2.1 in the Punjab, 2.0 in N. W. F. P., 1.4 in Madras and 0.7 in Bombay.

The mortality rate, excluding the Andamans, was 1.7 p. m. as against 2.0 in 1931 and 2.5 the decennial mean.

C. P., the increase was negligible. In B. & O., the large increase occurred chiefly in the Patna camp jail and was attributed to the anæmic and debilitated state of many prisoners who on admission were found to be harbouring dysenteric infections and were thus instrumental in introducing these into the jails. In the Punjab, the increase was due to the greater prevalence of dysentery in the Montgomery central jail; in the U. P. to the prevalence of diarrhoea in the Gorakhpur jail.

As compared with 1931, the combined admission rate fell in Assam (—28·5), Madras (—18·4), Bengal (—8·6), Burma (—7·8), U. P. (—4·1), Punjab (—0·3) and the Andamans. In B. & O. the rate doubled; the increase in the N. W. F. P. was very small. The combined death rate was below both the rate for 1931 and the decennial mean.

201. *Malaria*.—Excluding the Andamans. 24,250 admissions with 74 deaths were recorded as against 24,342 and 75, respectively, in 1931. The admission rate was 155·3, the rate for 1931 being 176·3 and the decennial mean 179·0. In the Andamans, 1,803 admissions and 38 deaths were reported as against 3,334 and 59 in 1931, i.e., an admission rate of 242·8 and a death rate of 5·1 as compared with 438·4 and 7·8 in 1931 and 319·7 and 4·5 the decennial means. The highest admission rate was returned in the Punjab (270·3), followed by N. W. F. P. (269·8), Bengal (277·0), Assam (167·5), Bombay (149·7), B. & O. (142·7) and U. P. (142·6). The incidence was as usual low in Madras (13·3), Burma (22·0) and C. P. (59·4). In Assam, Bengal, B. & O. and C. P. the admission rate was in excess of the rate for 1931 and the decennial mean; whilst in Burma, U. P., Punjab, Bombay, Madras and the Andamans it was lower. The jails reporting high malarial incidence included:—

*N. W. F. P.*—Haripur (890), Peshawar (756), Kohat (202), Dera Ismail Khan (176) and Abbottabad (119).

*Punjab*.—Rawalpindi (617), Lahore central (550), Lahore Borstal (511), Multan central old (483), Rohtak (399), Montgomery (377), Lyallpur (355), Multan district (255), Ludhiana (210), Ferozepore (208), Multan central new (192), Attock camp (180), Dehra Ghazi Khan (176), Hissar (162) and Ambala (156).

*Delhi*.—Delhi district jail (751).

*U. P.*—Cawnpore (362), Banda (334), Bareilly central (227), Agra central (210), Mainpuri (203), Fatehpur (190), Unao (184), Fatehgarh district (172), Benares central (170) and Etah (170).

*B. & O.*—Patna camp (888), Champaran (123), Bhagalpur (116), Purnea (105), Baxur (81) and Monghyr (65).

*Bengal*.—Alipore central Indians (823), Jessore (467), Tippera (434), Mymensingh (306), Midnapur (294), Krishnagar (221), Rajshahi (209), Dinajpur (197), Dacca (191), Jalpaiguri (183), Burdwan (160), Suri (147), Faridpur (142), Bakarganj (134), Presidency central, Indians (133) and Khulna (102).

*C. P.*—Jubbulpore (101) and Akola (78).

*Bombay*.—Hyderabad central (434), Visapur (393), Yeravda (320), Karachi (316), Thana (147), Nasik Road (134), Shikarpur (131) and Sind Gang (103).

*Madras*.—Bellary (43), Trichinopoly (24) and Madura (20).

The incidence was highest in the Gangetic Plain and Chota Nagpur (2,184 admissions), followed by Bengal and Orissa (1,021), the Deccan (797), North-West Frontier, Indus Valley and North-Western Rajputana (658), the Upper Sub-Himalayan region (593), Southern India (472), Assam (423), Western Coast (271), the Coast of Burma and Bay Islands (246), South Western Rajputana, Central India and Gujarat (161), the interior of Burma (142) and the Hills (45). The incidence *per mille* of average strength is given in Table B appended to this section (pages 462 and 403).

200. *Diarrhœa*.—3,626 admissions and 32 deaths were reported as against 2,891 and 37 in 1931. Of these 953 or 26% occurred in Bengal; 659 or 18% in B. & O.; 571 or 16% in the U. P., 555 or 15% in Bombay; and 441 or 12% in the Punjab. In Burma, N. W. F. P., Madras, Andamans, Assam and C. P., the incidence was low.

The eastern side of India, comprising Bengal and Orissa, continued to record the highest admission rate (59.1 p. m.), followed by the Deccan (37.4), the Western Coast (29.3), Assam (27.9), the Gangetic Plain and Chota Nagpur (27.5), the Upper Sub-Himalayan region (17.7), North-West Frontier, Indus Valley and North Western Rajputana (16.9), and the South Western Rajputana, Central India and Gujarat (13.5). In Burma, the South of India, the Hills and the Andamans the incidence was low.

Compared with 1931, B. & O. (+15.3), C. P. (+15.3), Bombay (+6.8), U. P. (+5.6), Bengal (+2.2) and Assam (+0.5) recorded increases; the Andamans (—8.6), the Punjab (—6.4), N. W. F. P. (—2.9), and Burma (—1.9) recorded decreases.

A combined tabular statement for dysentery and diarrhœa similar to that given in the more recent reports is again included.

TABLE X (iii).

	Admission rate p. m.			Death rate p. m.		
	Mean 1922-31.	1931.	1932.	Mean 1922-31.	1931.	1932.
India .	59.8	61.6	65.5	2.1	1.4	0.9
N. W. F. P.	36.7	22.1	22.4	0.8	0.2	0.1
Punjab .	34.7	59.4	58.1	0.9	0.5	0.8
U. P. .	33.2	41.4	37.3	1.1	0.8	0.8
B. & O. .	136.2	91.9	196.3	2.4	2.4	1.4
Bengal .	135.3	126.2	117.6	2.3	2.0	1.1
C. P. .	65.8	60.6	65.9	2.0	3.5	1.2
Bombay .	74.3	75.4	93.2	0.8	0.6	0.3
Madras .	52.3	62.7	46.3	3.9	1.1	0.6
Assam .	142.5	168.2	139.7	4.2	4.8	4.2
Burma .	42.3	27.8	20.0	3.1	1.2	1.1
Andamans	49.5	25.2	14.3	4.8	4.7	1.5

The admission rate for 1932 for dysentery and diarrhœa combined was almost half the decennial mean in Burma and less than half in the Andamans. In Assam, Bengal, N. W. F. P. and Madras also it was lower than the mean, but increases were recorded in B. & O., U. P., Punjab and Bombay. In



Nearly 70% of the cases occurred in Bengal (1,731), U. P. (1,420) and Madras (739); of the remaining 30% Burma recorded 475, B. & O. 341, Punjab 215, Assam 206, Bombay 154, N. W. F. P. 142, and C. P. 48.

In Bengal, Dacca central jail was responsible for 377 or 22% of the admissions; Midnapore central (342), Bakarganj (208), Presidency central Indian (206) and Tippera (170) for 53%. In Madras Presidency, Trichinopoly central jail alone recorded 313 or 42% of the total admissions, other high figures being Madura 84, Bellary central 75, and Coimbatore and Cuddalore 47 each. In the U. P., nearly 53% of the cases were treated in Agra central and district jails, Allahabad and Moradabad district jails and over 17% in Cawnpore, Etah and Gonda. In Burma, of the 475 cases treated, Rangoon central Asiatics (156), Maubin (65), Insein (47), Paungde (41), Tharrawaddy (38), Akyab (37), Moulmein (28) and Myingyan (23) accounted for 91%. In the Punjab, of the 215 admissions, Ferozepore and Montgomery jails returned 71 and 60 respectively. In B. & O. of a total of 341 admissions, Purulia (66), Purnea (65), Cuttack (54), Muzaffarpur (52), Sambalpur (34) and Patna camp (33) reported 90%. In N. W. F. P., 141 of the 142 admissions were registered in Haripur central jail. In Bombay Presidency, 89% of the total admissions (154), occurred in the jails of Nasik Road (60), Thana (45) and Bijapur (32). In the C. P., Raipur (20) and Akola (18) contributed nearly 80% of the total incidence. In Assam of the 206 admissions, 177 or 86% were returned from Gauhati (78), Sylhet (64) and Shillong (35).

197. *Cholera*.—26 admissions with 7 deaths were registered as compared with 5 and 2 respectively in 1931. Seven cases with 1 death occurred in the U. P., 6 and 3 in B. & O., 6 and 2 in the Punjab, 5 and 1 in Bengal, and 1 non-fatal case in Palampur in the Western India States Agency.

198. *Smallpox*.—86 admissions and 5 deaths were reported as compared with 34 and 2 respectively in 1931. Nearly 84% of these cases occurred in the U. P. (28), B. & O. (16), Bengal (15), and Burma (13).

199. *Dysentery*.—There were 7,080 admissions and 120 deaths as against 6,078 and 172 in 1931. The order of incidence by provinces was as follows:—

	1932.	1931.		1932.	1931.
B. & O.	1,723	506	Assam .	425	468
Bombay	976	611	Burma .	388	482
Bengal .	966	1,081	C. P. .	201	254
U. P. .	798	1,010	N. W. F. P.	119	62
Punjab .	717	619	Andamans	67	86
Madras.		772			

In B. & O. and Bombay large increases were recorded; in N. W. F. P. and the Andamans the incidence continued to be low.

The jails reporting high incidences were Patna camp (1,375 admissions) in B. & O.; Yeravda central (340) in Bombay Presidency; Dacca central (262), Midnapore (127), Rangpur (116) and Bakarganj (110) in Bengal; Rajahmundry (182) in Madras Presidency; Gauhati (133) in Assam; Allahabad district (64) in the U. P. Delhi (68); Montgomery (110) in the Punjab; Peshawar (67) in N. W. F. P.; and Jubbulpore (60) in C. P.

of uncertain origin (+2.2), respiratory diseases (+2.1), dysentery (+1.5) and pneumonia (+0.7). The admission rate for cholera was about 5 times that for 1931 but was equal to the decennial mean; that for smallpox was 3 times that for 1931 and 1.5 times the decennial mean.

The principal causes of death in order of gravity and their rates *per mille* of jail population, excluding the Andamans, were pneumonia (2.6), tubercle of the lungs (1.7), dysentery (0.7), malaria (0.5), respiratory diseases (0.4), enteric fever (0.3), diarrhoea (0.2), anæmia and debility (0.2) and pyrexia of uncertain origin (0.1). The death rates from pneumonia, tubercle of the lungs, dysentery, anæmia and debility, influenza and enteric fever showed decreases; those from malaria, respiratory diseases, enteric fever and diarrhoea remained stationary.

Including the Andamans, the death rate for malaria was 0.7 p. m. against 0.9 in 1931 and 0.9 the decennial mean; that for dysentery 0.7 against 1.2 in 1931 and 1.8 the decennial mean, and that for anæmia and debility 0.4 against 0.6 in 1931 and 0.4 the decennial mean.

Notwithstanding the serious overcrowding in some of the provincial jails, no untoward outbreak of infectious disease occurred except of dysentery in the Patna camp jail in B. & O. and of cerebro-spinal meningitis in the Borstal Institution, Lahore (Punjab). Eight cases of scurvy were reported in C. P., 3 in Bombay and 1 in N. W. F. P.

Cerebro-spinal fever was responsible for 29 cases with 11 deaths in the Punjab of which 25 and 11 occurred in the Borstal Institution, Lahore, and 5 cases in the subsidiary jails in this province. Nine cases and 8 deaths were recorded in Bombay Presidency; 7 and 6 respectively in Shikarpur district jail; and 2 fatal cases in the Sind Convict Gang. Two fatal cases occurred in Bengal; Bogra and Chittagong jails each had 1 fatal case; and 1 non-fatal case was reported from Benares central jail in the United Provinces.

196. *Influenza*.—Excluding 20 admissions with no death in the Andamans, 5,534 admissions and 29 deaths from this cause were recorded in Indian jails, against 7,851 and 48 respectively in 1931. The incidence in the jails in provinces during the quinquennium ending 1932 is given in Table X (ii)

TABLE X (ii).

	Admission <i>per mille</i> .				
	1928.	1929.	1930.	1931.	1932.
India. .	<b>24.1</b>	<b>23.6</b>	<b>33.9</b>	<b>51.0</b>	<b>34.0</b>
N. W. F. P.	..	..	52.6	22.9	<b>18.0</b>
Punjab .	11.2	23.5	17.7	46.9	<b>10.2</b>
U. P. .	29.7	24.6	23.5	48.6	<b>38.6</b>
B. & O. .	67.5	46.6	48.1	81.5	<b>28.4</b>
Bengal .	54.2	25.6	72.5	113.6	<b>108.0</b>
C. P. .	18.9	5.7	42.0	45.2	<b>9.6</b>
Bombay .	17.8	25.5	19.6	10.1	<b>9.4</b>
Madras .	22.0	32.0	32.8	53.1	<b>55.7</b>
Assam .	37.1	14.0	46.8	97.0	<b>54.1</b>
Burma .	13.7	24.9	45.6	62.2	<b>22.2</b>
Andamans	1.0	0.4	2.9	2.4	<b>2.7</b>

of 1931 but exceeded the mean. In the U. P., the slight increase in the sick rate was ascribed to the prevalence of influenza and mumps in some jails; in Bengal, apparently to a tornado disaster at the Mymensingh jail; and in the N. W. F. P. to the bad or indifferent health of many prisoners on admission.

192. Excluding the Andamans, although the admission to hospital rate of 603 p. m. was still high, it was nevertheless lower than that for 1931 and the decennial mean, in spite of the acute overcrowding which generally existed. The highest admission rate was recorded in Bengal (1,101 p. m.) owing to increased prevalence of malaria, dysentery and diarrhoea; the lowest in Madras (306). Rates in other provinces in descending order were Punjab 802 p. m., N. W. F. P. 730, B. & O. 674, Assam 602, U. P. 539, Bombay 536, Andamans 521, C. P. 344 and Burma 315. The rates in Bengal, B. & O., and C. P. were in excess of those for 1931 and the decennial mean; in Burma, Assam, Punjab and Bombay they were lower. In N. W. F. P. it was twice that of 1931, but in the Andamans it was only about one-half. Compared with the decennial mean the most noticeable decreases occurred in Burma (—305 p. m.), Andamans (—193), Bombay (—117) and Assam (—102).

Bengal and Orissa returned the highest admission rate of 1,077 p. m. as against 978 in 1931 and 955 p. m. the decennial mean. Other rates were 766 in the Upper Sub-Himalayan region; 692 in the North-West Frontier, Indus Valley and North Western Rajputana; 594 in the Gangetic Plain and Chota Nagpur; 584 in Assam, 570 in the Hills and 521 in the Andamans. The rate in Southern India was the lowest.

193. Excluding the Andamans, the death rate was 10·7 p. m. as against 12·9 in 1931 and 14·1 the decennial mean and was the lowest on record. Compared with the previous year, the death rate was lower in every province except Bengal, where a negligible increase occurred due to a tornado disaster in the Mymensingh jail which caused 31 deaths. The most noticeable decreases were recorded in the Andamans (—11·6 p. m.), C. P. (—9·0), and B. & O. (—7·6). The death rate was below the mean in all the provinces, the largest decreases compared with the mean occurring in Madras (—8·9 p. m.), N. W. F. P. (—6·2), Burma (—6·1), C. P. (—4·7), Assam (—3·9) and Bombay (—3·5). In the Andamans the rate fell from 34·8 p. m. in 1931 to 23·2.

The highest death rate was reported in Assam (19·2 p. m. against 20·2 in 1931 and 22·6 the decennial mean), and the lowest on the Western Coast (7·2 against 11·0 in 1931 and 15·6 the decennial mean).

194. These figures show that, although serious overcrowding existed, the sickness and mortality rates in jails in British India were kept at satisfactory levels.

#### Causes of Sickness and Mortality.

195. The principal recorded causes of sickness, in order of priority, and their rates *per mille* of jail population, excluding the Andamans, were malaria (155·3), dysentery (44·9), abscess, ulcer and boil (40·3), influenza (35·4) respiratory diseases (32·6), diarrhoea (23·0), pyrexia of uncertain origin (13·8), pneumonia (12·8), anæmia and debility (8·3) and tubercle of the lungs (5·9). Malaria showed a further decrease of 21·0 p. m., influenza of 21·5, anæmia and debility of 1·3, tubercle of the lungs of 0·6 and abscess, ulcers and boils of 0·5; whilst increases were recorded under diarrhoea (+2·8), pyrexia

## SECTION X.

## HEALTH OF JAILS IN INDIA.

## Population, Sickness and Mortality Rates.

190. The year 1932 witnessed an unprecedented increase in the jail population in India (excluding the Andamans), this being due in large measure to a revival of the civil disobedience movement early in the year. The daily average population was 156,152, as compared with 138,063 in 1931, 139,123 in 1930 and 125,730 the decennial mean for 1922-31.

Compared with the previous year, the U. P. (+4,558), Bombay (+3,806), N. W. F. P. (+2,675) and B. & O. (+2,338) recorded the largest increases.

Table X (i) gives the authorised accommodation, the daily average strength and the maximum population confined on any one day in jails and sub-jails during the years 1931 and 1932 and shows that in many cases the state of overcrowding was very serious. The excess population was provided for in special jails, camps and tents.

TABLE X (i).

	Authorised accommodation excluding hospitals and observation cells.		Daily average population.		Maximum confined on any one day.	
	1932.	1931.	1932.	1931.	1932.	1931.
N. W. F. P. . . .	5,051	4,988	7,944	5,725	10,650	7,700
Punjab . . . . .	15,013	15,141	23,058	21,601	30,941	31,505
U. P. . . . .	33,827	33,766	36,703	32,145	*	*
B. & O. . . . .	14,301	14,310	14,379	11,319	22,685	19,001
Bengal . . . . .	18,999	19,071	22,618	19,300	32,671	26,900
C. P. . . . .	6,518	6,418	5,665	4,848	7,511	7,121
Bombay . . . . .	23,186	21,397	19,085	16,151	*	*
Madras . . . . .	25,096	25,340	16,134	15,495	*	*
Assam . . . . .	3,552	3,206	3,809	3,331	*	*
Burma . . . . .	20,923	21,098	21,680	20,298	*	*

NOTE.—The statistics in this table include those of sub-jails.

191. The constantly sick rate, exclusive of the Andamans, was 22 p. m. a figure lower than that of the preceding year (24 p.m.). In descending order, the provincial rates were:—Bengal 38, B. & O. 33, N. W. F. P. 32, Assam 28, Andamans 27, Punjab 22, U. P. 21, Bombay 19, Madras 18, Burma 11 and C. P. 11. In Burma, Assam, Punjab and C. P., the rate was lower than that of 1931 and the decennial mean; in Bengal, U. P. and N. W. F. P. it exceeded the rate for 1931 and the mean; in B. & O. it was lower than that

## Abbreviations:—

N. W. F. P.	North-West Frontier Province.
B. & O.	Bihar and Orissa.
U. P.	United Provinces of Agra & Oudh.
C. P.	Central Provinces & Berar.
p. m.	per mille.
I. G. of P.	Inspector-General of Prisons.

\* Data not available.

**Madras.**

186.

*Examination Results.*

	On rolls.	1st year.		2nd year.		3rd year.		4th year.	
		A.	P.	A.		A.		A.	P.
Royapuram . . . . .	390	56	56	94	61	93		144	88
Prince of Wales, Tanjore . . . .	183			54	39	61	60	59	35
Lady Willingdon's for Women, Madras	109	30	19	29	19	24	24	29	18
Missionary, for Women, Vellore. .	101	25	20	19	14	14	14	20	9

NOTE.—The first year class of the Tanjore Medical School was abolished with effect from the 20th May, 1932, preliminary to the abolition of the entire school from the 1st May, 1933, on which date the students were transferred to the Medical School, Royapuram.

**Assam.**

187. *Berry-White Medical School, Dibrugarh.*—229 students were on the rolls. Of these 66 appeared for the final examination and 28 passed. Of the 53 students who appeared for the compounders' examination, 19 passed.

**Burma.**

188. *Burma Government Medical School, Rangoon.*—The total number of students on the rolls was 195; these comprising 149 old students, 40 new admissions and 6 re-admissions. Of 63 students appearing for the Diploma of the Licensed Medical Practitioner, 42 passed.

**The Countess of Dufferin's Fund.**

189. A total of 288 women students were on the rolls in different medical colleges in India. 27 scholarships were awarded, 18 at the Lady Hardinge Medical College, Delhi, 3 at Bombay, 3 at Madras, and 3 at Calcutta. Of these scholarships, 18 were awarded from Association Funds and the remainder from Trust Funds administered by the Countess of Dufferin's Fund.

The extent of the work done in Dufferin hospitals may be estimated from the following figures :—

New in-patients . . . . .	159,239
New out-patients . . . . .	2,103,867
Out-patients (old and new)	5,189,180

**Gynæcological cases :—**

Indoor . . . . .	9,319
Outdoor . . . . .	74,119

**Midwifery cases :—**

Abortions . . . . .	1,487
Normal labour . . . . .	8,014
Abnormal labour . . . . .	2,324

**Operations :—**

Abdominal . . . . .	1,404
General or spinal anaesthesia	10,282

**Bengal.**

182. The following table summarises details of the nine medical schools in the Presidency.

*State Medical Faculty.*

	On rolls.	Primary.		Intermediate.		Final.		Compounders examination	
		A.	P.	A.	P.	A.	P.	A.	P.
Campbell School, Calcutta .	594	149	117	141	96	126	78	69	48
Dacca School .	530	144	104	138	64	177	87	11	8
Ronaldshay School, Burdwan .	222	40	38	74	38	61	36	20*	18*
Lytton School, Mymensingh .	242	67	36	44	29	75	38	2	2
National Medical Institute, Calcutta.	400	104	80	98	36	168	55	..	..
Calcutta School . . . .	429	101	82	129	68	118	62	..	..
Bankura School . . . .	236	57	36	76	22	77	36	..	..
Chittagong School . . . .	127	47	35	60	26	..	..	..	..
Jackson School, Jalpaiguri	167	64	51	78	38	..	..	..	..

A. = Appeared.

P. = Passed.

\* School test examination.

**Central Provinces.**

183. *Robertson Medical School, Nagpur.*—There were 249 students on the rolls. 44 students appeared for the final Board examination and 24 passed.

**Central India.**

184. *King Edward Medical School, Indore.*—There were 309 students on the rolls.

*Examination Results.*

	Appeared.	Passed.
1st L. C. P. & S. (Bombay)	2	2
2nd do. do.	3	3
Final do. do.	7	6
L. M. P. (Nagpur) .	90	43
L. M. P. (Calcutta) .	44	17
Compounders . . . .	125	122

**Bombay.**185. *L. C. P. S. Examination Results.*

	1st		2nd		Final	
	A.	P.	A.	P.	A.	P.
Byramjee Jeejeebhoy School, Poona . . .	105	80	95	88	134	29
Ditto Ahmedabad . . . .	62	43	65	30	61	27
Medical School, Hyderabad (Sind) . . .	43	41	37	20	27	10

x 2

## IV.—Medical Schools.

178. The 27 medical schools in existence are distributed as follows:—Bengal 10; Madras 4; Bombay 3; United Provinces 2; Punjab 2; Bihar and Orissa 2; Burma 1; Central Provinces 1; Assam 1; and Central India 1.

## Punjab.

179. (a) *Medical School, Amritsar*.—Of 389 students on the rolls, 48 belonged to the military pupils' class. 114 students appeared for the final L. S. M. F., and 80 passed.

(b) *Punjab Medical School for Women, Ludhiana*.—133 students were on the rolls, 14 passed the final professional licentiate examination.

## United Provinces.

180. (a) *Medical School, Agra*.—Of 338 students on the rolls 58 belonged to the military pupils' class.

## Examination Results.

Licentiate Examination :—	Appeared.	Passed.
Primary . . .	60	52
Intermediate . . .	106	76
Final . . .	109	66

(b) *Women's Medical School, Agra*.—89 students were on the rolls.

## Examination Results.

Diploma Examination :—	Appeared.	Passed.
Primary . . .	22	20
Intermediate . . .	25	18
Final . . .	17	10

## Bihar and Orissa.

181. (a) *Medical School, Darbhanga*.—There were 233 students on the rolls; 59 appeared for the final Board examination and 44 passed; 59 students of the compounder class appeared for the qualifying examination and 49 passed.

(b) *Orissa Medical School, Cuttack*.—There were 199 students on the rolls. 52 students appeared for the final Board examination and 31 passed. 33 candidates appeared for the compounders examination and 23 passed.

the auspices of the I. R. F. A. ; and (iv) anthropometric measurements in Bombay under the auspices of the I. R. F. A.

*Medical College, Madras.*—The department of anatomy had under progress investigations into (a) the relationship of stature to the long bones of the body and (b) the development of the bat's wing. The department of dermatology investigated certain aspects of the aetiology and treatment of psoriasis ; in the out-patient department of the General Hospital, psoriasis cases were 2 % of all skin cases ; males were much more affected than females ; and a large protein intake definitely aggravated the disease. The department of hygiene was engaged chiefly on the preparation of a pamphlet on hygiene and nutrition and on the analysis of certain diets. The department of medicine carried out chemical tests of *Sembulani* and atebirin and obtained more satisfactory results with totaquina than with quinine sulphate or quinine hydrochloride. With the help of the bio-chemistry department, an investigation was made in connection with the diagnosis of kala-azar by studying the serum albumin, serum globulin, euglobulin and paraglobulin contents of suspected cases. The results were embodied in a paper published in the I. J. M. R. *Rowolfia serpentina* was found useful in cases of high blood pressure but was being further tried. An interim report on pernicious anæmia of pregnancy was published in the I. J. M. R.

In the department of pathology, work on the cultivation and transmission of *Rhinosporidium seeberi* to laboratory animals did not yield promising results. Of the 38 rats and 10 bandicoots examined for *Leptospira icterohæmorrhagica*, 5 bandicoots showed the organism in their kidneys ; the serological behaviour and pathogenic action of these organisms was being studied. Other researches dealt with were (a) the action of quinamine, an alkaloid of the cinchona plant, on the cardio-vascular system ; (b) the action of urea stibamine and other pentavalent antimony compounds on the heart and circulation ; (c) the keeping properties of digitalis preparations in the tropics with special reference to solid and dry preparations ; and (d) the relationship of the gonads with the function of the thyroid in rodents and monkeys.

The physiology department studied (i) the vital capacity of South Indians, analysing the results according to age, height, weight, body, surface, etc. ; (ii) the effects of the nerves supplying the intestine and of the various animal extracts on the intestinal movements in anæsthetised cats ; (iii) the effects of lack of vitamin A and D in normal and pregnant albino-rats and of the efficacy of placental administration in such cases.

The research unit was engaged chiefly on the chemical examination of *Tylophora asthmatica* which is a reputed remedy for dysentery and whose leaves and root bark are believed to possess medicinal properties similar to those of *ipecacuanha* (B. P.). Extract of *Cassia fistula* was found of benefit in cases of blackwater fever and quantities of the extract were distributed in endemic areas in the Vizagapatam agency. Of the total alkaloids of *Tabernaemontana coronaria*, two distinct fractions were separated, (a) a strongly basic amorphous substance yielding no crystalline salts and having a marked cardiac action and (b) a white powder of a feebly basic nature having only a comparatively weaker action on the heart than the former. Detailed results will be published later.



This college is affiliated to the Andhra University but medical examinations are held conjointly with those of the Madras University.

*University Examination Results.*

	Appeared.	Passed
Pre-Registration .	86	42
M. B. B. S. :—		
First { Part I	37	26
{ Part II	44	28
Second { Part I	6	4
{ Part II	20	13
Final { Part I	20	16
{ Part II	49	13

**Medical Research.**

177. The following brief paragraphs indicate the activities of various college departments in the field of medical research.

*Medical College, Lahore.*—Original investigations were carried out by members of the medical, pathological and pharmacological departments and 17 scientific papers embodying the results obtained were published or were under preparation.

*Prince of Wales Medical College, Patna.*—The pharmacological department carried out research work on *Rauwolfia serpentina* and Abrine. The physiology department investigated the cholesterol content of blood after splenectomy and unilateral and bilateral adrenalectomy. A paper entitled "Thyroid gland as affected by deficiency of vitamins A and B" was read by the professor of physiology at the meeting of the Patna Medical Association in February, 1933. The anatomy department investigated certain structural abnormalities in human bodies; whilst the organic chemistry department concluded an investigation on chaulmoogra oils, etc., and submitted a paper entitled "An observation on mill polished rice and its vitamin contents" for publication in the Patna Journal of Medicine. The biological department worked on the inheritance of disease.

*Medical College, Calcutta.*—The biological department carried out research work on the anatomy of fish and communicated two papers to the Indian Science Congress; the department of anatomy published a paper on "Fusion of cervical vertebræ" in the Journal of Anatomy.

*King Edward Memorial Hospital and the Seth Gordhan Das Sundar Das Medical College, Bombay.*—Published papers numbered 21 and investigations completed or under progress included :—

- (i) Artificial pneumothorax and its limitations as a therapeutic measure, under the auspices of the Ratanji Ranchhodji Desai Fellowship; (ii) the rabbit ovulation test, under the auspices of Dr. Mangaldas V. Mehta Research Scholarship; (iii) determination of hæmoglobin in health and in anæmias in Bombay, under

	Appeared.			Passed.			Passed part only.		
	Apl. 1932.	Dec. 1932.	Jan. 1933.	Apl. 1932.	Dec. 1932.	Jan. 1933.	Apl. 1932.	Dec. 1932.	Jan. 1933.
1st M. B. B. S.	41	81	..	25	37	..	..	..	..
2nd do.	34	..	47	18	..	26	..	..	..
3rd do.	42	56	..	18	19	..	8	8	..

Two candidates appeared for the B.Sc. in Physiology ; one passed. Seven candidates appeared for the M.D. degree of whom one passed with distinction. Five appeared for the M.S. degree and 3 passed. Of 4 who appeared for the Diploma in Ophthalmology one was successful.

### Madras Presidency.

176. (a) *Medical College, Madras*.—738 students were on the rolls.

	M.	F.	Total.
M. B. B. S. . . . .	479	71	550
L. M. S. . . . .	17	1	18
Military Medical Pupils . . . .	64	..	64
L. M. P. S. qualifying for M. B. B. S.	10	..	10
Chemists and Druggists . . . .	7	..	7
Public Health Diploma . . . .	6	..	6
Sanitary Inspectors . . . . .	83	..	83
Total . . . . .	666	72	738

### University Examination Results.

	Appeared.	Passed.
L. M. S. :—		
Final, Part II	34	15
M. B. B. S. :—		
1st . . . . .	180	95
2nd . . . . .	104	58
3rd . . . . .		
Final, Part II	168	42

Of the military medical students, 5 were in the final year ; 2 appeared for the final M.B.B.S. and failed. One of these 2 also appeared for the Board examination and passed ; the other obtained in the University examination sufficient marks required for a pass in the final Board examination. Of the 3 others, 2 appeared for the final Board examination in December, 1932, and 1 passed. Two appeared for the final Board examination in April, 1933, and 1 passed.

(b) *Medical College, Vizagapatam*.—193 students were on the rolls at the beginning of the academical year, 50 being new admissions, but the number at the end was only 170. These variations were mainly due to the results of the university examinations and to the withdrawal of passed candidates.

No students appeared for the preliminary or intermediate examinations.

(c) *School of Tropical Medicine and Hygiene, Calcutta.*—A total of 100 students were on the rolls.

*University Examination Results.*

	Appeared.	Passed.
D. T. M.	38	33
D. P. H. { Part I	23	23
{ Part II	27	24
L. T. M.	39	22

Three students were awarded distinction in the D. T. M. of whom one gained the Chunilal Bose Medal.

**Bombay Presidency.**

175. (a) *Grant Medical College, Bombay.*—The total number of regular students on the rolls at the end of the year was 551, of whom 77 were women. No military students were under training.

	Appeared.	Passed.	
		M.	F.
M. B. B. S. :—			
1st Examination { April .	72	32	1
{ December	132	48	13
2nd Examination { April	59	24	7
{ January .	73	33	8
3rd Examination { Group A { April .	90	30	4
{ Group A { December	100	32	4
{ Group B { April .	110	54	2
{ Group B { December	106	30	6
M. D. :—			
I. Medicine	6	..	..
II. Pathology	..	..	..
III. Midwifery	2	1	..
M. S. . . . .	8	2	..
B. Hy. { Part I .	7	4	..
{ Part II .	10	4	..
Ophthalmology .	4	2	..

(b) *Seth Gordhandas Sunderdas Medical College, Bombay.*—The regular students on the rolls numbered 342. This total included 24 women students and 70 new admissions.

M. B. B. S. :—	
First { 1st year .	69
{ 2nd year	54
Second 3rd year .	60
Third { 4th year .	52
{ 5th year .	88
B. Sc. . . . .	3
Post-graduates .	16
Total	342

**Bihar and Orissa.**

173. *Prince of Wales Medical College, Patna.*—The number of students on the rolls was 264.

*University Examination Results.*

M. B. B. S. :—		Appeared.	Passed
2nd	{ Part I, October 1932 .	18	12
	{ Part II, " " .	18	10
Final	{ Part I, " " .	27	14
	{ Part II, " " .	22	8
1st	{ December 1932 .	36	24
	{ Supplementary, March 1933	12	12
2nd	{ Part I, March 1933 .	43	25
	{ Part II, " " .	36	22
Final	{ Part I, " " .	33	14
	{ Part II, " " .	29	9

**Bengal Presidency.**

174. (a) *Medical College, Calcutta.*—A total of 751 students, including 47 military and 18 female students, were on the rolls.

*University Examination Results.*

M. B. B. S. :—		Appeared.		Passed.	
		M.	F.	M.	F.
Preliminary Science		119	4	97	4
1st . . . . .		107	2	73	..
2nd . . . . .		101	1	75	1
3rd . . . . .		90	4	68	4
Final . . . . .		238	2	66	2
Military Students :—					
Preliminary Science		12	..	10	..
Intermediate		18	..	8	..
Final membership { Part I		5	..	4	..
{ Part II		12	..	10	..

(b) *Carmichael Medical College, Belgachia.*—597 students were on the rolls.

*University Examination Results.*

M. B. :—		Appeared.	Passed
Preliminary Science . . . . .		148	97
1st . . . . .		117	72
2nd . . . . .		108	82
3rd . . . . .		87	63
Final . . . . .		165	35
State Medical Faculty :—			
Final membership . . . . .		8	5

5 from the N.-W. F. P. Government and 38 from other non-government sources.

*University Examination Results.*

		Appeared.	Passed
M. B. B. S. :-			
1st	{ May	104	50
	{ October	51	22
2nd	{ May	76	72
	{ October	8	6
Final	{ April	46	27
	{ October	71	36
Punjab State Medical Faculty Membership		9	3
Post-graduates (Assistant Surgeons)		14	14

**Delhi.**

171. *Lady Hardinge Medical College for Women, New Delhi.*—The session began with 149 resident students.

*University Examination Results.*

		Appeared.	
Intermediate Science	. . . . .	21	16
M. B. B. S. :-			
1st	. . . . .	18	12
2nd	. . . . .	17	10
3rd	. . . . .	11	11
Final	{ Part A . . . . .	17	13
	{ Part B . . . . .	16	12

**United Provinces.**

172. *King Edward Medical College, Lucknow.*—252 students were on the rolls.

*University Examination Results.*

		Appeared.	Passed.
M. B. B. S. :-			
1st	. . . . .	56	38
Final	Part I { Group A	53	41
	{ Group B	75	45
Final	Part II . . . . .	61	35
D. P. H. :-			
Part I.	. . . . .		
Part II	. . . . .		
M. D.	. . . . .		
M. S.	. . . . .		

helminthiasis 10, tuberculosis 8, *status epilepticus* 9, dysentery and diarrhoea 17, and other causes 15. The number of deaths in the *United Provinces* increased to 171 due to outbreaks of influenza and cholera at Agra and Bareilly and to the bad state of health of many of the admissions. The chief causes of sickness were general debility, malaria, ankylostomiasis, abscess, dysentery and phthisis. Dental treatment of patients was introduced at the Agra mental hospital. In *Burma*, the chief causes of death were tuberculosis 16, general paralysis of the insane 9, *status epilepticus* 6 and exhaustion from mania and dementia 6 each.

167. The Kanke mental hospital at Ranchi provides all the latest approved methods of treatment having due regard to eastern conditions. These include drugs, organotherapy, physiotherapy, hydrotherapy and occupational therapy. In other institutions similar lines of treatment were followed. Sports and amusements, feasts, picnics, parôles, drives and the provision of libraries were special features.

168. In Tezpur, Calicut and Tadagale hospitals water supplies were inadequate.

169. Table IX (*u*) gives provincial expenditure on the maintenance and upkeep of mental institutions.

TABLE IX (*u*).

	TOTAL.	Diet.	Bedding and clothing.	Medicines.
	Rs.	Rs.	Rs.	Rs.
<b>British India</b>	<b>34,22,637</b>	<b>9,47,082</b>	<b>1,25,562</b>	<b>20,978</b>
Punjab	3,96,254	85,411	21,224	1,418
U. P.	2,37,463	68,791	8,522	620
B. & O.	8,84,020	2,35,264	49,540	9,743
C. P. .	91,429	30,170	1,730	32
Bombay	7,05,064	2,05,171	32,579	924
Madras	4,80,962	1,82,627	7,174	923
Assam	1,13,095	48,659	3,530	207
Burma	5,14,350	90,989	1,263	7,111

### III.—Medical Colleges.

#### Punjab.

170. *King Edward Medical College, Lahore*.—The total number on the rolls was 439. Eight students received scholarships from the Punjab Government,

165. Tables IX (s) and IX (t) give details of the 3,094 admissions by age-groups and religions. Over 71 % were between 20 and 40 years of age ; nearly 61 % were Hindus and 22 % Muhammedans.

TABLE IX (s).

	Under 20 years.		20 to 40 years.		40 to 60 years.		Over 60 years.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
<b>British India</b>	194	64	1,794	414	419	151	39	15	2,446	648
Punjab	34	19	232	42	42	5	5	..	313	66
U. P.	25	8	323	47	74	21	5	2	430	78
B. & O.	11	6	93	41	28	28	4	1	136	76
C. P.	8	..	58	8	5	2	..	..	71	10
Bombay	50	13	477	174	102	46	12	8	641	241
Madras	31	9	337	77	118	38	9	2	495	126
Assam	10	4	96	10	14	5	..	..	120	19
Burma	22	5	178	15	36	10	4	2	240	32

TABLE IX (t).

	Hindus.		Muhammedans.		Christians.		Others.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
<b>British India</b>	1,502	374	581	94	195	134	168	46	2,446	648
Punjab	153	42	151	18	7	5	2	1	313	66
U. P.	311	57	111	16	8	3	..	2	430	78
B. & O.	65	22	25	6	43	44	3	4	136	76
C. P.	62	7	8	1	..	1	1	1	71	10
Bombay	411	140	144	36	68	46	18	19	641	241
Madras	337	85	101	18	57	28	..	..	495	126
Assam	90	16	11	2	2	..	8	1	120	19
Burma	64	5	30	2	10	7	136	18	240	32

166. In *Bombay Presidency*, the chief causes of death were dysentery 33, diseases of digestive system 27, malaria 25, tuberculosis 14, nervous diseases 9, pneumonia 8, anæmia 6 and diarrhoea 4. The Naupada mental hospital reported the highest death rate, 2.2 per 1,000 daily average strength. In *Central Provinces*, the 26 deaths included colitis 5, epilepsy 4, dysentery 3, pneumonia, pulmonary tuberculosis, old age and valvular disease of the heart 2 each. Prophylactic measures against cholera and smallpox were taken as usual. About 14 % of the new admissions were found to be infected with hookworm. In *Assam*, of 52 deaths, 17 were due to tuberculosis and 16 to dysentery. Arrangements for segregation of such patients were satisfactory. In *Madras*, of 103 deaths recorded, 74 were in Madras, 22 in Calicut and 7 in Waltair. Of the total, 37 deaths (29 in Madras) were ascribed to tubercular disease, 16 to diseases of the nervous system, 7 to dysentery, other diseases of digestive system 7, diseases of circulatory system 5, influenza 4 and general diseases 4. In the Kanke hospital, in *Bihar and Orissa*, 21 deaths were recorded which included pneumonia 4, tuberculosis of the lungs 3, general diseases 4 and diseases of nervous and circulatory system 2 each. The chief causes of death in the *Punjab* mental hospital were pneumonia 10, debility 7,

artisans 13, in military service 8, clerks 7, beggars 6, business men 3, medical profession 3, physicians 3, *sadhus* 3, other occupations 7 and unknown 98. In *Madras*, admissions included persons with no occupation 180, labourers 69 and cultivating tenants 45. In the *Central Provinces*, admissions included cultivators 11, Government servants 10, labourers 10, dependents 7, shop-keepers 7, private servants 5, students 4, artisans 3, beggars 3, sweeper 1 and no occupation 20. In *Burma*, most of the admissions were included in cultivators 73, coolies 48 and no occupation 33.

164. Principal types of insanity treated are given in Table IX (q). Mania, melancholia and dementia were most common.

TABLE IX (q).

	Punjab.	U. P.	B. & O.	C. P.	Bombay.	Madras.	Assam.	Burma.	Total
Total . . . .	1,365	2,071	1,679	512	2,824	2,137	719	1,495	12,802
Idiocy . . . .	49	88	17	16	50	42	2	20	284
Imbecility . . . .	54	103	69	35	161	117	1	55	585
Mania . . . .	563	716	291	220	790	445	306	507	3,857
Melancholia . . . .	97	287	177	89	589	122	272	346	1,979
Insanity, Circular, alternating.	44	23	113	3	181	143	..	22	529
Stupor ( <i>energetic or delusional</i> ).	4	27	11	..	26	27	..	18	113
Delusional insanity . . . .	23	82	115	16	115	92	16	50	509
Acute delirium . . . .	..	1	7	..	4	3	..	1	16
Confusional insanity . . . .	27	160	65	12	57	52	..	63	436
Syphilitic insanity . . . .	1	33	4	2	53	41	..	45	179
Insanity alcoholic . . . .	8	21	32	3	41	69	..	25	199
Insanity, <i>cannabis indica</i> . . . .	69	282	110	7	139	152	70	20	849
Dementia Praecox . . . .	144	84	301	45	306	564	40	204	1,688
Dementia primary . . . .	256	83	184	17	231	212	3	67	1,053
secondary . . . .	..	..	..	..	..	..	..	..	..
Other types . . . .	26	81	183	37	82	56	9	52	526

Details of the main aetiological factors are given in Table IX (r).

TABLE IX (r).

	Punjab.	U. P.	B. & O.	C. P.	Bombay.	Madras.	Assam.	Burma.	Total.
Total . . . .	404	517	384	164	932	1,220	165	290	4,076
Heredity . . . .	17	23	24	4	81	33	6	11	249
Mental instability . . . .	117	67	26	44	140	186	1	41	572
Deprivation of special senses.	1	1	..	..	..	..	..	1	3
Critical periods . . . .	..	58	10	16	79	37	..	40	240
Child-bearing . . . .	6	9	2	..	26	9	..	..	52
Mental stress . . . .	51	33	42	27	111	227	9	34	534
Disorders of nutrition or metabolism . . . .	..	25	3	3	70	78	..	40	219
Infective and toxic . . . .	98	106	38	6	155	176	26	71	676
Traumatic . . . .	..	3	..	..	4	7	..	1	15
Diseases, nervous system . . . .	17	20	11	6	45	65	12	6	182
Other afflictions . . . .	1	79	2	1	65	23	..	3	174
No cause assignable . . . .	..	..	..	..	64	6	111	..	181
No cause ascertained . . . .	96	93	226	57	92	373	..	42	979



mental hospital, Agra. Table IX (o) gives the numbers of mental hospitals, accommodation available, the maximum population confined and space per patient.

TABLE IX (o).

	Number.	Accommodation.			Maximum confined.			Square feet per head.
		M.	F.	Total.	M.	F.	Total.	
British India	19	7,134	2,110	9,244	7,927	2,345	10,272	..
Punjab	1	826	182	1,008	799	217	1,016	70
U. P.	3	1,294	429	1,723	1,265	365	1,630	50
B. & O.	2	1,120	372	1,492	1,154	341	1,495	30 50
								European. Indian.
C. P.	1	344	126	470	345	99	444	54
Bombay	6	1,066	453	1,524	1,461	656	2,117	50
Madras	3	894	254	1,148	1,223	389	1,612	45
Assam	1	566	124	690	529	105	634	50
Burma	2	1,024	165	1,189	1,151	178	1,324	67

162. Admissions, total population, daily average strength, daily average sick, cures and deaths are given in Table IX (p).

TABLE IX (p).

	Admitted.	Population.			Cured.	Died.	Average strength.	Average sick.	Criminal insanes.
		M.	F.	Total.					
British India	3,109	9,935	2,888	12,823	1,311	699	9,924	741	
Punjab	379	1,032	288	1,365	186	76	989	68	224
U. P.	508	1,634	437	2,071	261	171	1,576	172	81
B. & O.	212	1,282	397	1,679	89	24	1,472	60	532
C. P.	81	405	107	512	37	26	433	19	131
Bombay	822	1,986	838	2,824	393	186	2,004	85	191
Madras	631	1,646	501	2,147	213	103	1,560	243	244
Assam	144	601	117	718	29	52	608	48	265
Burma	272	1,280	208	1,507	103	61	1,282	46	620

163. In *Bihar and Orissa* cases classified by occupation were coolies 15, no occupation 14, cultivators 13, servants 12, dependents 6, housewives 5, *chaprasis* and students 4 each, *ayahs*, carpenters and shopkeepers 3 each, other professions 28 and unknown 24. In *Bombay Presidency*, domestic and private servants including housewives numbered 156, clerks 50, beggars 36, coolies 36, labourers 26, teachers 24, students 20, mill workers 20, cultivators 17, other professions 247, unknown 150 and no occupation 100. In *Assam*, cultivators numbered 25, teagarden coolies 42 and dependents 11. In the *United Provinces*, of 508 new cases, cultivators numbered 108, professionals 53, labourers 49, beggars 46, public servants 45, shopkeepers 43, domestic and household workers 56, students 19, artisans 12, landlords 7, priests 3 and unknown 67. In the *Punjab* mental hospital, of the 379 cases admitted, cultivators were 57, housewives 42, labourers 33, Government and private servants 27, students and teachers 24, no occupation 24, shopkeepers 21,

### B.—Indian States.

159. *Burma (Federated Shan States).*—A total of 24 state-public and 2 private-aided dispensaries provided 346 beds for males and 127 for females. Five of the state-public institutions treated outdoor patients only. A total of 258,918 cases were treated, including 8,983 indoor and 249,935 outdoor.

Total income and expenditure amounted to Rs. 2,08,240 and Rs. 1,88,537 respectively. Salaries of medical officers cost Rs. 54,871; nursing staffs Rs. 15,066; patients' diets Rs. 22,169; and medicines Rs. 22,638.

160. *Mysore State.*—Of the 278 hospitals and dispensaries, 28 were state-public, 219 local and municipal fund, 6 private-aided, 14 state-special, 4 private non-aided and 7 railway institutions. Available beds numbered 2,129 (1,040 for males and 1,089 for females) including 841 male and 982 female in classes I, III and IV dispensaries.

Patients treated in classes I, III and IV institutions totalled 3,610,655 (36,341 indoor and 3,574,314 outdoor). Malaria cases were 600,959, enteric fever 3,051, dysentery 56,094, gonorrhoea 15,069, syphilis 15,883, ankylostomiasis 14,654, leprosy 475, plague 2,433, pneumonia 9,792, pyrexia of uncertain origin 174,806, tubercular diseases 2,327, diabetes 1,566 and scurvy 197. Labour cases numbered 6,306 with 111 deaths. *Unani* and *ayurvedic* dispensaries treated 1,382,520 patients. Surgical operations totalled 86,383.

The 280 midwives attended 17,093 maternity cases or 61 cases each. Maternity hospitals were stationed in Bangalore, Mysore and the Kolar Gold Fields.

The Princess Krishnajammanni tuberculosis sanatorium, Mysore, admitted 315 patients; of these 3 were cured, 239 relieved and 25 died. The epidemic diseases hospitals at Bangalore, Kolar Gold Fields and Mysore treated 1,548 cases and reported 643 cures and 404 deaths. Admissions to the leper asylum, Bangalore, totalled 176, whilst the leper out-patient dispensary continued its useful work. The leprosy survey of Bangalore city detected 14 lepers among mill and factory workers.

Total income was Rs. 13,99,877 and total expenditure Rs. 13,99,153; salaries cost Rs. 8,98,339; medicines Rs. 1,25,628 and patients' diets Rs. 1,41,985.

### II.—Mental Hospitals.

161. The total accommodation in the 19 mental hospitals provided for 9,244 patients but the maximum number confined on any one night was in excess in Bombay (+593), Madras (+464), and Burma (+135). In the Ranchi Indian Mental hospital, Kanke, 75% of the patients were from Bengal and 25% from Bihar and Orissa, whilst the Ranchi European hospital received patients from Bengal, U. P., the Punjab, B. & O., the C. P. & Berar, Assam and British Baluchistan. Cases from Delhi province were admitted to the

Total receipts, including cash balances, were Rs. 49,07,215 and included Rs. 20,01,627 contributed by government, Rs. 14,11,841 from local and municipal bodies and Rs. 1,31,047 from subscriptions, donations, etc. Total expenditure amounted to Rs. 39,36,681; patients' diets cost Rs. 3,25,565, medicines Rs. 3,17,461, salaries of medical staffs Rs. 10,16,471 and salaries of nursing staffs Rs. 4,25,613. Expenditure on nursing staffs in the Rangoon General hospital amounted to Rs. 1,72,132; in Akyab Rs. 14,650; in Rangoon contagious diseases hospital Rs. 23,290; in Syriam Rs. 13,615; in Bassein Rs. 12,911; in Moulmein Rs. 10,223; in Mandalay Rs. 49,005; and in Maymyo Rs. 21,150.

### Baluchistan.

157. Hospitals and dispensaries numbered 49, of which 31 were state-public, 2 state-special, 1 local fund, 3 Dufferin Fund private-aided, 4 private non-aided and 8 railway institutions. During the year, 4 dispensaries were opened and 3 were closed. Available beds numbered 692, of which 526 were for males and 166 for females. Cases treated totalled 779,721; these included 625,907 (9,613 indoor and 616,294 outdoor) in classes I, III and IV institutions. Malaria cases numbered 149,036, diseases of the digestive system 130,018, diseases of the eye 97,354, ulcerative inflammation 88,499, respiratory diseases 56,623, skin diseases 23,931, diseases of areolar tissue 22,693, diseases of the ear 22,637, diseases of stomach 21,611, intestinal diseases 16,946 and diseases of circulatory system 485. Infectious diseases included dysentery 6,697, enteric fever 279, gonorrhoea 789, syphilis 1,075, leprosy 17, relapsing fever 59, influenza 1,440, tuberculosis of lungs 562, other tubercular diseases 433, ankylostomiasis 2, diabetes 79 and scurvy 514. Labour cases totalled 619, of which 3 died. Anti-rabic treatment was given to 12 persons in the civil hospital, Quetta. Surgical operations numbered 16,851.

The Quetta isolation hospital admitted 147 cases including smallpox 66, typhus 47, leprosy 16, measles 11, erysipelas 4, chickenpox 2 and mumps 1.

Total income of classes I, III and IV institutions was Rs. 2,91,804 and total expenditure Rs. 2,64,010. Salaries of medical officers cost Rs. 80,163, nursing staffs Rs. 15,530, medicines Rs. 35,543 and patients' diets Rs. 10,867.

### Aden.

158. In the civil hospital, available beds for males numbered 100 and for females 28, and 11,384 patients (1,354 indoor and 10,030 outdoor) were treated. Diseases of digestive system totalled 2,277 and injuries 2,063; the former group included diseases of stomach 316 and intestinal disease 141. Other figures were malaria 871 cases, pneumonia 103, gonococcal infection 92, syphilis 90, dysentery 67, enteric fever 3, leprosy 7, pyrexia of uncertain origin 22, tuberculosis of the lungs 122, other tubercular disease 86, diabetes 7, scurvy 6 and opium poisoning 3. Labour cases numbered 21 and surgical operations 730.

TABLE IX (n).

Districts.	Trained midwives and nurses.			Districts.	Trained midwives and nurses.		
	R.	U.	Total.		R.	U.	Total
Akyab . . . .	2	10	12	Mergui . . . .	2	2	4
Arakan Hill tracts . .	..	..	..	Mandalay . . . .	6	62	68
Kyaukpau . . . .	1	1	2	Kyaukse . . . .	4	2	6
Sandoway . . . .	2	2	4	Meiktila . . . .	..	5	5
Rangoon (town) . . . .	..	140	140	Yamethin . . . .	..	8	8
Insein . . . .	7	4	11	Myingyan . . . .	1	2	3
Hanthawaddy . . . .	8	12	20	Bhamo . . . .	1	7	8
Pegu . . . .	4	3	7	Myitkyina . . . .	1	4	5
Tharrawaddy . . . .	2	8	10	Katha . . . .	4	..	4
Prome . . . .	3	7	10	Shwebo . . . .	..	2	2
Maubin . . . .	4	13	17	Sagaing . . . .	8	5	13
Pyapon . . . .	3	4	7	Lower Chindwin . . . .	5	2	7
Bassein . . . .	8	27	35	Upper Chindwin . . . .	1	..	1
Henzada . . . .	7	5	12	Pakokku . . . .	2	2	4
Myaungmya . . . .	3	7	10	Thayetmyo . . . .	1	4	5
Toungoo . . . .	..	17	17	Minbu . . . .	2	3	5
Salween . . . .	..	1	1	Magwe . . . .	..	5	5
Thaton . . . .	5	4	9	Chin Hills . . . .	..	..	..
Amherst . . . .	..	17	17				
Tavoy . . . .	..	6	6	Total	97	403	500

Patients totalled 3,086,579 cases and included 2,833,707 in state-public, local-fund and private-aided hospitals and dispensaries (111,045 indoor and 2,722,662 outdoor). Malaria cases numbered 383,114 or nearly 13% of the total, digestive diseases 333,041, respiratory diseases 264,450, skin diseases 257,582, injuries 246,494, ulcerative inflammation 221,596, roundworms 196,097, intestinal disease 171,908, eye 156,384, ear 123,237 and stomach 98,561. Dysentery accounted for 30,232 cases, enteric fever 1,481 with 172 deaths, gonococcal infection 22,144, syphilis 30,524, kala-azar 160, leprosy 2,766, influenza 24,705, relapsing fever 62, pneumonia 5,585, pyrexia of uncertain origin 69,467, tuberculosis of the lungs 5,191, other tubercular disease 1,772, ankylostomiasis 945, roundworms 196,097, diabetes 682, scurvy 35 and beri-beri 1,564. Maternity cases numbered 12,414, of which 183 died. The quinine alkali method of treating malaria in association with plasmoquine was largely used. Owing to financial stringency no new venereal clinics were opened. Travelling dispensaries in the districts of Tavoy and Katha treated cases of yaws by N. A. B. and sulpharsenol; the leper hospitals at Mandalay, Moulmein and Rangoon and the leper home, Mandalay, continued to work successfully. Surgical operations numbered 117,963.

Most of the dysentery cases were recorded in the districts of Sylhet, Goalpara, Kamrup, Nowgong, Cachar and Darrang, and it is hoped that a wider use of bacteriophage will reduce the incidence of this disease. The question of the prevention of tuberculosis received attention and a provincial anti-tuberculosis committee was formed. The present hospital accommodation for tubercular cases is said to be inadequate. Leprosy cases continued to be treated at all *sadr* and sub-divisional headquarter hospitals and at the more important outlying dispensaries. Details of the work done at the leper asylum at Sylhet, the leper hospital at Kohima, the leper ward at Dhubri and the leper colony at Tura will be found in section II of this report (page 97). The provincial Leprosy Relief Committee assisted in the erection of leprosy sheds at out-centres. The number of anti-rabic treatment centres increased from 45 to 50.

As regards nursing services, 2 trained nuns were attached to the Gauhati civil hospital; the appointment of 3 trained sisters of charity in the Dibrugarh hospital was sanctioned; and proposals for a similar staff for the hospitals at Sylhet and Shillong were under consideration. Nurses were appointed at Nowgong and Silchar and several locally selected young women were under training at Calcutta and Delhi. Only 30 trained midwives and nurses were at work in the province, 23 in urban areas and 7 in the rural areas of Goalpara, Sibsagar, Lushai Hills and Balipara Frontier Tract.

The departmental cadre consisted of 291 medical officers and subordinates; these included 177 in rural and 114 in urban areas.

Income and expenditure were Rs. 9,25,451 and Rs. 7,75,528, Government contributions amounting to 46% of the total income and over 27% from local funds. Total expenditure included Rs. 3,12,624 on medical officers, Rs. 1,19,538 on medicines and Rs. 3,551 on nurses, divided between the Sylhet *sadr* hospital (Rs. 1,522), Shillong (Rs. 949), Gauhati (Rs. 600), and Jowai (Rs. 480).

### Burma.

156. The number of medical institutions decreased from 305 to 300; of these 183 were in rural and 117 in urban areas and 92 rural and 75 urban institutions were maintained by local and municipal funds. In addition to 122 children's and 16 special beds, available beds numbered 7,391, of which 5,581 were for males and 1,810 for females. A total of 6,513 beds were provided in the state-public, local-fund and private-aided hospitals and dispensaries. Only 5 institutions of classes I, III and IV are maintained exclusively for women, 3 in Rangoon and 1 each in Bassein and Mandalay. Only 1 of the 5, the Dufferin hospital, Rangoon, treated in-patients, 132 beds being available.

The medical staff totalled 559, those in rural areas numbering 210 and in urban areas 349. Table IX (n) gives the distribution of nursing staffs by districts.

aided institutions, the total income of which amounted to Rs. 80,92,375 and expenditure to Rs. 80,77,283. Medicines and instruments cost Rs. 11,88,107, patients' diets Rs. 9,00,462, salaries of medical officers Rs. 17,78,183 and those of nursing staffs Rs. 9,06,803.

### Coorg.

154. A total of 296,528 patients were treated in the 12 rural and 2 urban institutions. Available beds numbered 154, of which 88 were for males and 66 for females; all were in classes I, III and IV institutions.

Malaria was the chief cause of sickness, with 105,715 cases, influenza 7,388, dysentery 4,854, pneumonia 2,198, pyrexia of uncertain origin 1,938, rheumatic fever 4,723, anaemia 3,546, gonococcal infection 353, syphilis 202, tuberculosis of the lungs 75, other tubercular disease 39, ankylostomiasis 1,378, leprosy 1, diseases of the eye 4,677, respiratory diseases 34,709, diseases of the stomach 3,063, intestinal diseases 5,500, liver diseases 1,307, other diseases of digestive system 28,780 and skin diseases 24,632. Surgical operations numbered 4,121.

Total income of the state-public and local-fund hospitals and dispensaries was Rs. 1,00,638 and the whole amount was expended.

### Assam.

155. Out of a total of 257 medical institutions, 189 were in rural and 59 in urban areas. Available beds numbered 1,649—1,274 for males and 375 for females. The female section of the Halfong hospital was completed and the generosity of a donor made possible the construction of a female block at the Golaghat hospital.

Treatment was given to 2,518,298 patients including 2,298,060 in state-public, local-fund and private-aided hospitals and dispensaries (15,739 indoor and 2,282,321 outdoor). The districts of Kamrup, Nowgong, Goalpara, Darrang and Sylhet, the Garo Hills and the Khasi and Jaintia Hills all contributed to the increase in numbers. Malaria cases totalled 637,072, skin diseases 441,743 (including 300 cases of yaws), respiratory diseases, excluding tuberculosis and pneumonia, 161,564, diseases of the digestive system 150,641, roundworms 148,077, ulcerative inflammation 99,916, eye disease 98,918, injuries 92,767, diseases of the organs of locomotion 85,736, diseases of the stomach 80,613, pyrexia of uncertain origin 48,892, dysentery (mainly bacillary) 42,674, influenza 29,086, rheumatic fever 12,353, anaemia 12,175, gonococcal infection 4,951, kala-azar 3,696, syphilis 2,265, pneumonia 2,073, tuberculosis of the lungs 1,413, ankylostomiasis 901, enteric fever 458, leprosy 451 and other tubercular diseases 231. Opium poisoning cases numbered 6 only. Surgical operations totalled 21,493 and 833 labour cases, with 17 deaths, were conducted. The anti-syphilitic campaign in the Naga and Lushai Hills was continued, 126 and 70 cases, respectively, being treated.



Details of the medical and nursing staffs are given in table IX (*m*). For the first time in the history of the nursing service, the number of qualified nurses available for appointment as staff nurses was in excess of requirements. At the instance of the Madras Nurses and Midwives Council, a scheme of training and examination of candidates for the vernacular course in midwifery in government hospitals was sanctioned by the local government. The register of the Council at the end of 1932 contained the names of 780 nurses, 1,668 midwives and 7 *daïs*. The educational course for medical licentiates was extended from 4 to 5 years, the new syllabus being designed to conform with that of the conjoint Board in England.

Available beds in the 1,337 hospitals and dispensaries numbered 11,207, of which 6,112 were for males and 5,095 for females. State-public, local-fund and private-aided institutions provided 9,079 beds (5,173 male and 3,906 female) and private non-aided institutions 1,751 (603 male and 1,148 female). Classes I, III and IV female hospitals and dispensaries had 1,047 beds.

A total of 16,031,728 patients sought treatment (15,392,927 in 1931), including 14,837,966 (210,319 indoor and 14,627,647 outdoor) in classes I, III and IV institutions. Daily indoor attendances in state-public, local-fund and private-aided institutions averaged 8,673 and outdoor attendances 97,078. Diseases of the skin numbered 1,869,043, digestive system 1,601,537, ulcerative inflammation 1,169,240, diseases of the eye 1,154,119, respiratory diseases, excluding pneumonia and lung tubercle, 1,113,746, diseases of the ear 1,046,411, malaria 1,031,363, injuries 953,506 and intestinal disease 807,500. The principal diseases among in-patients were those of the generative system, the digestive system, the eye, injuries and malaria. Dysentery cases numbered 304,209, enteric fever 13,836, gonococcal infection 98,951, syphilis 104,230, kala-azar 6,579, leprosy 46,749, influenza 185,740, relapsing fever 1,141, pneumonia 31,448, tuberculosis of the lungs 40,896, other tubercular diseases 18,210, beri-beri 16,756, diabetes 12,846 and scurvy 879. Cpium poisoning cases numbered 968, with 5 deaths. Labour cases numbered 92,348 (indoor 25,542 and outdoor 66,806) of which 80,172 were normal and 12,176 abnormal as compared with 68,680\* and 15,003 in 1931. Venereal clinics were maintained at the headquarters hospitals at Coimbatore, Cuddapah, Masulipatam, Madura, Calicut, Nellore, and Tanjore; at the Women and Children's Hospital at Calicut and Negapatam; at the Government hospital, Rajahmundry; and at the Government General Hospital, Madras. Surgical operations totalled 527,811.

As the "group leprosy scheme" described in previous reports worked successfully, its continuance for a further period of two years was sanctioned. Of 196 leprosy clinics, 120 were opened during 1932 and leprosy treatment was provided at 14 additional medical institutions.

Government contributed Rs. 57,84,437 and local and municipal funds Rs. 15,68,239 towards the maintenance of state-public, local-fund and private-



TABLE IX (l).

District.	Trained midwives and nurses.		
	R.	U.	Total.
Bombay City		219	219
Thana .		3	4
Kolaba .		5	7
Ratnagiri		2	2
Karwar		9	9
Poona .		22	23
Ahmednagar		3	4
Nasik .		7	8
West Khandesh		17	22
East Khandesh		17	22
Satara .		3	10
Sholapur .		16	16
Belgaum		12	12
Dharwar		24	30
Bijapur		9	9
Surat .		10	12
Broach .		3	3
Kaira .		3	3
Panch Mahals		3	3
Ahmedabad .		35	36
Mahi Kantha		1	1
Karachi .	4	19	23
Hyderabad .	..	6	6
Nawabshah .	2	8	10
Thar and Parkar .	2	2	4
Sukkur .	..	20	20
Larkana .	12	5	17
Upper Sind Frontier	1	1	2
Total	53	484	537

### Madras Presidency.

153. Of the 1,337 medical institutions at work, 1,089 were rural and 248 urban. This total included 192 state-public, 33 state-special, 494 local and municipal fund, 481 subsidised private-aided, 90 private non-aided and 47 railway dispensaries. 30 dispensaries were newly opened, 20 were closed and 10 transferred to other classes or departments. The "visited dispensary" system, under which a dispensary medical officer or practitioner visits neighbouring villages on two specified days a week, was in force in 6 districts and in the Vizagapatam Agency but the results obtained were not satisfactory.

The new ophthalmic block at the King George hospital, Vizagapatam, was completed and with the opening of the new outpatients department at the Government General hospital, Madras, the dental department was transferred from the Royapuram hospital,

### Bombay Presidency.

152. 676 medical institutions were at work, of which 332 were in rural and 344 in urban areas. Available beds numbered 9,352, of which 5,634 were for males and 3,718 for females. Of this total, 7,174 were in state-public, local-fund and private-aided institutions. A total of 5,440,332 patients were treated, including 3,734,974 (104,534 indoor and 3,630,440 outdoor) in state-public, local-fund and private-aided institutions. Of the total, 1,350,778 patients sought treatment at the state-public, local-fund and private-aided hospitals and dispensaries in the Deccan, 898,132 in Sind, 722,188 in the Konkan, 720,266 in Gujerat and 43,610 elsewhere. The daily average indoor and outdoor attendances numbered 4,634 and 34,040 respectively.

In the 19 female hospitals and dispensaries of classes I, III and IV, 771 beds were available and 113,391 patients were treated; of these 22,351 were indoor and 91,040 outdoor. The daily average number of inpatients was 576 and of outpatients 954.

Cases of malaria numbered 939,468, dysentery 80,894, syphilis 37,791, gonococcal infection 24,876, influenza 69,970, pneumonia 24,842, pyrexia of uncertain origin 67,631, tuberculosis of the lungs 27,989, other tubercular disease 10,426, ankylostomiasis 1,127, roundworms 194,164, enteric fever 6,675, kala-azar 3, leprosy 3,712, relapsing fever 184, scurvy 1,269, anaemia 34,444, diabetes 2,234, beri-beri 60 and rickets 7,286. Diseases of the eye numbered 456,720, those of the ear 267,593, nose 43,421, circulatory system 11,715, respiratory system, excluding pneumonia and lung tubercle, 369,049, diseases of the stomach 157,335 and intestinal disease 204,979. Normal maternity cases numbered 23,301, with 88 deaths, and abnormal labour cases totalled 3,650, with 166 deaths.

Surgical operations totalled 145,751, including 1,455, for the removal of tumours and cysts, with 14 deaths, 736 amputations, with 49 deaths, 7,407 operations on the eye including 2,842 for extraction of lens, 1,189 for vesicle calculi, 2,103 abdominal operations, 756 for hernia, 189 for abscess of the liver, 1,939 obstetric operations and 275 abdominal and 1,838 other operations for diseases peculiar to women.

Total receipts and expenditure of the state-public, local-fund and private-aided institutions were Rs. 57,44,912 and Rs. 54,64,715, respectively. Government contributions amounted to Rs. 27,59,530 and those from local and municipal funds to Rs. 4,53,256 and Rs. 15,11,115. Medical staffs cost Rs. 13,85,098; nursing staff Rs. 5,98,657; medicines Rs. 6,07,473; and patients' diets Rs. 5,00,544. Total income of female institutions was Rs. 6,26,289, of which Rs. 2,90,868 was contributed by government and Rs. 1,52,195 by local and municipal bodies. Total expenditure was Rs. 5,45,656; that on salaries of medical officers being Rs. 1,09,545; and that of nursing staffs Rs. 86,935.

A total of 634 medical officers were employed in state-public, state-special, local and municipal fund and private-aided institutions; of these 160 were in rural and 477 in urban areas. Nurses and midwives in the medical and health departments numbered 53 in rural and 484 in urban areas. Table IX (b) gives details by districts.

Excluding opening balances, the total income of the state-public, local-fund and private-aided institutions amounted to Rs. 34,27,302. Expenditure amounted to Rs. 30,49,576.

### Central Provinces.

151. Out of 327 hospitals and dispensaries, 172 were in rural and 155 in urban areas. Of the 172 rural institutions, 113 were maintained by local funds. Five dispensaries were opened and 15 were closed. Of the 229 state-public, local-fund and private-aided hospitals and dispensaries, 11 were for females only.

Eighteen probationer nurses were trained at the Mayo hospital, Nagpur and 9 at the Victoria hospital, Jubbulpore. Proposals to start training classes for nurses at the main hospital, Raipur, and at the Irwin hospital, Amraoti, were under consideration. Staff nurses were employed at the Mayo hospital, Nagpur, the Victoria hospital, Jubbulpore and at the main hospitals at Akola, Amraoti, Khandwa, Raipur, Saugor and Wardha. In rural areas, 33 trained midwives and nurses were employed and 141 in urban areas. Medical staffs numbered 1,073, of which 367 were in rural and 706 in urban areas. Honorary physicians, surgeons, dentists and specialists were employed at the Mayo hospital, Nagpur, the Victoria hospital, Jubbulpore, the Irwin hospital, Amraoti, and in the main hospitals at Raipur, Akola, Khandwa and Buldana.

Available beds numbered 1,749 for males and 1,058 for females. Of this total, 1,320 male and 800 female beds were in state-public, local-fund and private-aided institutions; railway dispensaries provided 46, including 6 for females.

Patients totalled 3,503,613, of which 3,030,638 attended the state-public, local-fund and private-aided institutions (34,035 indoor and 2,996,603 outdoor). Malaria cases numbered 404,667, pyrexia of uncertain origin 121,913, dysentery 47,970, influenza 49,975, rheumatic fever 38,714, roundworms 26,353, syphilis 18,015, gonococcal infection 13,734, pneumonia 6,010, liver diseases 7,561, diseases of the stomach 85,623, intestinal diseases 104,918, tubercular disease 2,525 and enteric fever 1,706. Normal maternity cases numbered 4,196, of which 10 died; abnormal cases numbered 1,228, with 77 deaths. Of 280 smallpox cases, only 63 were vaccinated; 109 were unvaccinated; the vaccinal state of the others was not recorded.

Surgical operations performed in classes I, III and IV institutions totalled 113,407. Selected operations numbered 5,991, including 666 for cataract.

Total receipts, including opening balances, of state-public, local-fund and private-aided hospitals and dispensaries amounted to Rs. 14,09,093. Government contributions aggregated Rs. 5,95,356 and local and municipal contributions Rs. 2,89,434. Total expenditure amounted to Rs. 11,87,952. Expenditure on account of salaries of medical officers and nursing staffs amounted to Rs. 3,96,744 and Rs. 88,967 respectively; patients' diets Rs. 15,656. Expenditure on nursing staffs included Rs. 14,894 at the Victoria hospital, Jubbulpore, Rs. 22,753 at the Mayo hospital, Nagpur, and Rs. 8,767 at the Dufferin hospital, Nagpur.

Except in mission and some headquarters hospitals, nursing arrangements were of a primitive character. A total of 373 European and Anglo-Indian and 355 Indian nurses were employed; these included 544 in provincial headquarters hospitals; 134 in district headquarters hospitals and other urban institutions; and 40 in rural hospitals.

### Calcutta.

150. Of 44 institutions open at the close of 1932, 21 treated out-patients only. In the other 23 institutions the available beds numbered 3,542. Nursing in the Presidency General Hospital maintained the high standard for which the hospital is famed. The Calcutta Hospital Nurses Institution recruited probationer nurses but its activities were restricted owing to financial stringency. Table IX (*k*) gives the numbers of nurses employed in the principal Calcutta hospitals during the past three years.

TABLE IX (*k*).

	Nurses.		
	1930.	1931.	1932.
Medical College Hospital . . . . .	193	184	168
Carmichael Hospital for Tropical Diseases . . . . .	20	20	20
Presidency General Hospital . . . . .	83	83	
Campbell Hospital . . . . .	52	52	52
Sambunath Pandit Hospital . . . . .	25	25	25
Mayo Hospital . . . . .	8	8	
Howrah General Hospital . . . . .	20	21	21
Lady Dufferin Victoria Hospital . . . . .	35	35	50*
Sree Vishudhananda Saraswati Marwari Hospital . . . . .	23	25	25
Carmichael Medical College Hospital, Belgachia . . . . .	47	47	51

\* Including pupil nurses and midwives.

The number of patients treated increased to 860,540 (57,177 indoor and 803,363 outdoor) in 1932. Malaria accounted for 65,467 cases (59,227 in 1931), kala-azar for 4,764 (6,322 in 1931), cholera 2,448 (2,427 in 1931), small-pox 391 (501 in 1931), influenza 28,169 (25,733 in 1931), tuberculosis of the lungs 10,035 (8,525 in 1931), venereal diseases 34,190 (28,123 in 1931) and beri-beri 3,247. In the diphtheria ward of the medical college hospitals, 17½ cases were treated and, of the 165 indoor cases, 89 died. The Presidency General and the Belgachia Medical College hospitals also treated 58 and 20 indoor cases, of which 2 and 4 died.

Surgical operations totalled 59,181, the medical college hospitals accounting for the largest number of these. Selected and other important operations numbered 10,471. Of the 1,802 operations for extraction of lens, 1,060 were performed in the eye department of the Medical College hospitals. Other figures included abdominal operations 1,483, obstetrical cases 700, operations on bone 508, excision of tumours 398, amputations 158, hernia 520, excision of elephantoid scrotum 58 and ovariectomies 69.

and kala-azar were continued. 721 patients were treated at the Radium Institute, Patna, and 164 tubercular cases at the Itki Sanatorium.

In addition to 1,228 female beds in the general hospitals and dispensaries (classes I, III and IV), five women's hospitals had accommodation for 209 cases. These were (a) Barh Bowstead Zenana hospital, Patna (12 beds); (b) Bihar Amawan Zenana hospital, Patna (12 beds); (c) Lady Elgin Zenana hospital, Gaya (80 beds); (d) Rani Shibatrini Lady Dufferin female hospital, Bhagalpore (35 beds); and (e) St. Columbia's female hospital, Hazaribagh (70 beds). The first two are maintained by local and municipal funds and the others receive financial aid from government. A total of 36,247 females (3,354 indoor and 32,893 outdoor) were treated. Surgical operations totalled 334,577.

Total income of state-public, local-fund and private-aided hospitals, excluding opening balances of Rs. 4,81,564, amounted to Rs. 27,06,957. Government contributed Rs. 9,33,067 and local and municipal funds Rs. 14,65,363. Total expenditure amounted to Rs. 26,81,022; salaries of medical officers Rs. 7,46,636; nursing staff Rs. 1,36,129; patients' diets Rs. 1,83,290; and medicines Rs. 5,14,786.

### Bengal (excluding Calcutta).

149. Excluding 64 homeopathic, 15 *ayurvedic* and 5 *unani* dispensaries, medical institutions totalled 1,200 including 967 rural, 230 urban and 3 railway. 31 dispensaries were opened and 9 closed during the year. 5,791 beds were available, 4,355 for males and 1,436 for females. Of these 3,352 were in state-public, local-fund and private-aided institutions, 1,183 in state-special, 824 in private non-aided and 432 in railway hospitals and dispensaries. Several temporary rural dispensaries were established for special purposes.

A total of 9,083,248 cases were treated; these included 8,658,019 in permanent institutions, 149,416 in the temporary rural dispensaries and 274,922 at the medical centres under the Public Health Department. Inpatients and outpatients numbered 82,598 and 9,000,650. 458,231 cases were treated in homeopathic, 42,228 in *ayurvedic* and 12,552 in *unani* dispensaries.

Malaria with 2,726,313 cases (2,697,076 in 1931), was as usual the chief cause of sickness. 55,763 patients attended for kala-azar (60,083 in 1931), 5,421 for cholera, 195,494 for dysentery, 132,236 for influenza, 464 for small-pox, 11,914 for tuberculosis of the lungs, 3,744 for other tubercular disease, 5,436 for beri-beri, 69,705 for venereal diseases,—including 34,472 for gonorrhoea, 23,854 for syphilis and 12,379 for other venereal infections,—4,163 for leprosy, 10,019 for enteric fever, 2,410 for relapsing fever, and 3,451 for ankylostomiasis. Surgical operations totalled 146,352.

Excluding opening balances, total receipts of state-public, local-fund and private-aided hospitals amounted to Rs. 26,87,279 and expenditure was Rs. 24,18,965. Government contributed Rs. 3,08,072 towards the upkeep and maintenance of these institutions. The expenditure on salaries of medical officers, salaries of nurses and patients' diets aggregated Rs. 13,36,571, Rs. 61,102 and Rs. 1,50,598, respectively.

Malaria accounted for 1,018,305 cases, dysentery for 135,028, pyrexia of uncertain origin 151,962, rheumatic fever 124,442, influenza 59,861, syphilis 38,700, gonococcal infection 25,566, pneumonia 24,372, tuberculosis of the lungs 19,214, other tubercular disease 16,640, enteric fever 7,255, leprosy 7,013, kala-azar 653, plague 2,282, relapsing fever 412, scurvy 289 and beri-beri 116. Labour cases numbered 7,289 of which 263 died; these included 6,679 cases in state-public, local-fund and private-aided institutions, 12 in state-special, 349 in private non-aided, 8 in subsidised and 241 in railway institutions. Surgical operations totalled 367,796.

Total receipts of state-public, local-fund and private-aided institutions amounted to Rs. 32,44,806 and total expenditure to Rs. 29,61,120. Government contributions aggregated Rs. 6,62,063; local fund and municipal contributions Rs. 16,29,287; Rs. 1,38,080 were expended on patients' diets, Rs. 4,20,958 on medicines, Rs. 8,38,767 on medical officers' salaries and Rs. 2,03,894 on the salaries of nursing staffs. Of the last item, King George's hospital, Lucknow, absorbed Rs. 65,388; Ramsay hospital, Nainital, Rs. 13,467; the European Civil hospital, Allahabad, Rs. 8,124; Dufferin hospital, Allahabad, Rs. 6,185; Barhpur mission dispensary (Farrukhabad), Rs. 7,453; Lady Lyall hospital and dispensary and the maternity hospital, Agra, Rs. 15,724; and St. Mary's College hospital, Dehra Dun, Rs. 6,166. The scheme for providing male nurses in hospitals remained in abeyance.

The King Edward Sanatorium, Bhowali, and the 5 tuberculosis dispensaries at Agra, Allahabad, Cawnpore, Lucknow and Sarnath (Benares), carried on useful work, details of which will be found in Section II (page 90). Facilities for the treatment of leprosy cases continued to be provided at many hospitals and in the leper hospitals at Lucknow and Moradabad and the asylums at Agra and Shahjahanpur. Dental clinics were at work in Agra, Cawnpore, Benares, Jhansi, Bareilly, Dehra Dun, Lucknow Balrampur hospital and the King George's hospital.

### **Bihar and Orissa.**

148. Eight institutions were opened and 5 were closed, so that a total of 675 hospitals and dispensaries with 5,737 beds (3,887 for males and 1,850 for females) were available. Of the total, 549 institutions were in rural and 126 in urban areas; and 415 and 59 respectively were maintained by local and municipal funds.

Numbers treated decreased to 7,250,123. State-public, local-fund and private-aided institutions treated 5,981,366 cases (66,557 indoor and 5,914,809 outdoor). Cholera cases decreased from 13,306 in 1931 to 3,684. Malaria was responsible for 1,057,842 cases (1,235,421 in 1931); venereal diseases 71,560; kala-azar 55,344 (56,274 in 1931); tuberculosis of the lungs 17,812; and influenza 64,255. Other diseases treated included dysentery 122,503 cases, enteric fever 709, smallpox 1,173, other tubercular diseases 7,700, ankylostomiasis 19,439, roundworms 134,163, scurvy 382 and beri-beri 704. Maternity cases numbered 5,984 with 205 deaths. The special government grants of Rs. 5,000 and Rs. 7,500 for the treatment of venereal diseases

A total of 1,016,121 patients sought treatment (19,674 indoor and 996,447 outdoor). The construction of the new Irwin hospital and the municipal schemes for an infectious diseases and a tuberculosis hospital remained in abeyance.

Malaria accounted for 139,770 cases (129,055 in 1931), influenza 109,236 (100,200 in 1931), dysentery 12,057, syphilis 7,732, gonococcal infection 6,101, enteric fever 1,055, leprosy 63, relapsing fever 18, smallpox 615, tuberculosis of the lungs 3,455 with 99 deaths, other tubercular diseases 3,368 with 15 deaths, kala-azar 12, ankylostomiasis 103, roundworms 836, scurvy 237, beri-beri 19, diabetes 138 and rickets 261. 21 cases of opium poisoning and 629 of other poisons were treated. 1,648 maternity cases were attended, with 18 deaths.

The municipality of Delhi spent Rs. 1,172 on the treatment of venereal diseases, 5,453 cases being treated.

Nursing staffs were generally inadequate, only 27 European and Anglo-Indian and 79 Indian nurses being employed.

Surgical operations totalled 32,658; of these, 31,866 were performed in the state-public, local-fund and private-aided institutions. Total income and expenditure of these three classes of institutions amounted to Rs. 6,29,698 and Rs. 6,12,593 respectively. Expenditure on nursing staffs was Rs. 1,29,762.

### United Provinces of Agra and Oudh.

147. The year commenced with 637 medical institutions,—323 in rural and 314 in urban areas,—and closed with 654,—341 in rural and 313 in urban areas. 32 dispensaries, including 14 subsidised, were opened in rural and 12 in urban areas. Of the 23 which were closed, 10 were rural and 13 urban institutions; 4 were transferred to other departments or classes. The cadre of the provincial medical service totalled 101 appointments, whilst that of the provincial subordinate medical service was 345, including 45 reserve. 52 honorary physicians and surgeons were employed in state and local-fund institutions. Government continued to grant subsidies for the building and maintenance of dispensaries and to encourage private practitioners to settle in rural areas. Subsidised rural dispensaries increased from 24 to 35, and 12 women sub-assistant surgeons and 6 midwife compounders worked in rural areas. No progress was made with the scheme of provincialisation of district headquarters hospitals. Available beds totalled 8,676 (5,825 for males and 2,850 for females). These included 6,698 (4,156 male and 2,542 female) in state-public, local-fund and private-aided institutions; 1,147 male and 6 female in state-special; 267 male and 246 female in private non-aided; and subsidised dispensaries 44 male and 13 female. Female institutions of classes I, III and IV provided 1,583 beds. A total of 8,144,442 patients were treated in all classes of hospitals and dispensaries. 6,879,189 (113,333 indoor and 6,765,556 outdoor) patients attended at state-public, local-fund and private-aided institutions and these included 27,759 indoor and 572,457 outdoor female patients treated in female hospitals and dispensaries.

18,446, kala-azar 86, leprosy 725, relapsing fever 401, tuberculosis of the lungs 14,970, other tubercular disease 13,185, ankylostomiasis 1,976, diabetes 2,454, scurvy 2,120 and beri-beri 25. Labour cases totalled 10,279 with 187 deaths.

Surgical operations performed in state-public, local-fund and private-aided institutions numbered 540,736. Of 68,618 selected operations, 26,001 were for cataract or extraction of lens.

Total income of state-public, local-fund, and private-aided hospitals and dispensaries amounted to Rs. 46,44,592, including government contributions aggregating Rs. 17,71,313, whilst total expenditure was Rs. 45,71,167. Patients' diets cost Rs. 1,59,210, medicines Rs. 6,40,422, and salaries of medical officers and nursing staffs Rs. 13,26,768 and Rs. 3,32,767 respectively. Details of expenditure on nursing staffs included Mayo hospital, Lahore, Rs. 51,330; Civil hospital, Amritsar, Rs. 36,149; Lady Reading hospital, Simla, Rs. 34,299; Ripon hospital, Simla, Rs. 30,822; Lady Willingdon hospital, Lahore, Rs. 26,778; Lady Aitchison hospital, Rs. 20,599; Walker hospital, Simla, Rs. 11,039; Memorial Mission hospital, Ludhiana, Rs. 10,796 and Mission hospital, Ferozepore, Rs. 10,666.

Efforts were made to increase the numbers of Indian hospital nurses and trained midwives particularly in rural areas. In order to stimulate recruitment a new cadre was instituted for Indian nursing sisters (persons of Asiatic domicile). A scheme was sanctioned to enable Indian women to join hospitals as probationer nurses, staff nurses and nursing sisters. An Act passed to provide for the registration and better training of nurses, health visitors, midwives, and *dais* was brought into force from September, 1932, and a Nurses Registration Council was being established. No examination for nurses has yet been prescribed and the training hospitals conducted examinations for the award of diplomas.

Of 414 trained nurses and midwives employed, only 43 were in rural areas and nearly half of these were in the districts of Kangra and Karnal.

In the Lady Willingdon hospital, Lahore, with 65 beds, 1,800 in-patients and 495 maternity cases were treated and gynaecological and obstetric operations numbered 1,479. The Lady Aitchison hospital, Lahore, was provincialised, whilst the Lady Hailey Women's hospital, Bhiwani, with an endowment of Rs. 2,75,000 continued to flourish. A touring woman doctor was appointed in Campbellpore district.

The Punjab dental hospital, Lahore, a charitable institution opened in 1930, treated 19,662 cases as against 17,895 in 1931. The anti-rabic treatment centre at the provincial bacteriological laboratory, Lahore, continued to do successful work.

### Delhi.

146. Four institutions were opened and 2 were closed, so that the total number of hospitals and dispensaries was 27 at the end of the year. Three of the 5 private-aided institutions, with 430 beds, were exclusively for women. In Delhi city, the Civil Dufferin hospital and 8 branch dispensaries provided 818 beds. Of these 322 were for males and 496 for females.



cases at Haripur was under further consideration. The Indian Council of the B. E. L. R. A.\* contributed Rs. 600 for anti-leprosy work.

Total receipts, inclusive of cash balances, of classes I, III and IV institutions amounted to Rs. 6,57,757 and total expenditure to Rs. 6,45,163. Government contributions aggregated Rs. 4,05,957 and local and municipal fund contributions Rs. 2,11,851. Salaries of medical officers cost Rs. 1,58,176 and those of nurses Rs. 28,209; patients' diets Rs. 29,896; and medicines Rs. 78,040.

Total expenditure on nursing staffs included Rs. 10,264 in the 2 *zenana* hospitals at Peshawar and D. I. Khan and Rs. 16,482 in the Lady Reading provincial hospital, Peshawar. Trained midwives and nurses numbered 28 of which 13 were in Peshawar city, 12 in other urban areas and 13 in rural areas. Female sub-assistant surgeons were appointed at the *tehsil* headquarters hospitals at Swabi and Nowshera.

### Punjab.

145. The year opened with 1,001† hospitals and dispensaries, 747 in rural and 254 in urban areas and closed with 974,—721 in rural and 253 in urban areas. Eight new institutions were opened of which 5 were in rural and 3 in urban areas; 34 were closed including 31 in rural areas.

Of the total, 694 were maintained by local and municipal funds and rural dispensaries numbered 359. No further district and *tehsil* headquarters hospitals were provincialised. Available beds numbered 10,082 (6,132 for males and 3,950 for females); these included 9,089 (5,281 male and 3,808 female) in state-public, local-fund and private-aided institutions. Daily indoor attendances averaged 6,891 and outdoor attendances 68,753. Of the 3,808 beds for females, 1,273 were available in women's hospitals, 308 were under lady doctors in the female sections of general hospitals and the remaining 2,227 in general hospitals.

Of the 14,233,657 patients attending at all classes of medical institutions 12,806,733 (191,276 indoor and 12,615,457 outdoor) were treated in state-public, local-fund and private-aided hospitals. State-public, local-fund and private-aided female hospitals and dispensaries numbered 42, whilst 21 women doctors were attached to the female sections of general hospitals. These provided 1,285 beds and treated 24,645 indoor and 401,119 outdoor patients, the daily average indoor attendance being 899.

Diseases of the eye totalled 3,126,182 cases, this being once more the largest single group. Malaria cases decreased from 2,133,153 to 1,876,293. Other figures are diseases of the digestive system 1,387,914, diseases of the ear 1,041,570, skin diseases 1,052,111, ulcerative inflammation 1,030,861, respiratory diseases excluding tuberculosis of the lungs and pneumonia 961,192, injuries 713,779, diseases of the stomach 530,977, intestinal diseases 484,161, diseases of the areolar tissue 330,015, diseases of nerves, spinal cord, brain and meningitis 253,365, diseases of the organs of locomotion 214,838, dysentery 174,052, enteric fever 20,948, gonococcal infection 13,608, syphilis

\* "B. E. L. R. A." = British Empire Leprosy Relief Association.

† Revised figure.

TABLE IX (j).

	Total Expenditure.		Expenditure in 1932.		
	1931.	1932.	Medical Officers.	Nurses.	Medicines.
	Rs.	Rs.	Rs.	Rs.	Rs.
<b>British India</b>	<b>3,78,59,043</b>	<b>3,60,40,377</b>	<b>92,82,520</b>	<b>35,18,898</b>	<b>48,46,842</b>
N. W. F. P.	6,13,264	<b>6,45,163</b>	1,58,176	28,209	78,040
Punjab .	51,07,865	<b>45,44,764</b>	13,26,768	3,32,767	6,40,422
Delhi .	6,44,644	<b>6,12,593</b>	1,00,600	1,29,762	53,659
U. P. .	29,19,308	<b>27,88,081</b>	8,38,767	2,03,894	4,20,958
B. & O. .	30,12,290	<b>26,81,022</b>	7,46,686	1,36,129	5,14,786
Bengal .	54,09,248	<b>54,68,541</b>	11,10,243	6,40,731	7,60,846
C. P. .	12,27,556	<b>11,43,811</b>	3,96,744	88,967	1,56,998
Bombay .	58,70,531	<b>53,79,816</b>	13,85,098	5,98,657	6,07,473
Madras .	81,05,514	<b>80,51,698</b>	17,78,183	9,06,803	11,20,215
Coorg .	1,18,215	<b>1,00,638</b>	31,997	8,285	20,903
Assam .	8,04,498	<b>7,75,428</b>	3,12,624	3,551	1,19,538
Burma .	37,35,257	<b>35,84,812</b>	10,16,471	4,25,613	3,17,461
Baluchistan	2,90,853	<b>2,64,010</b>	80,163	15,530	35,543

#### North-West Frontier Province.

144. Of the 100 hospitals and dispensaries, 31 were in rural, 38 in urban areas and 31 in agencies; 6 institutions were opened and 2 were closed. Four female hospitals were maintained by local and municipal funds. Available beds numbered 2,093 (1,603 for males and 490 for females), of which 1,175 (786 male and 389 female) were in state-public, local-fund and private-aided institutions. A scheme for subsidising private medical practitioners was introduced in a few selected areas. Total indoor and outdoor attendances numbered 1,748,103 (26,348 indoor and 1,498,633 outdoor) in classes I, III and IV institutions. Daily indoor attendances averaged 967; outdoor 6,752.

Diseases treated included malaria 438,210 cases (366,278 in 1931), dysentery 19,949, enteric fever 1,186, gonococcal infection 1,364, syphilis 5,693, pneumonia 6,289, with 158 deaths, relapsing fever 33, leprosy 54, influenza 3,034, pyrexia of uncertain origin 11,632, tuberculosis of the lungs 3,669, other tubercular disease 3,443, ankylostomiasis 126, roundworms 4,190, anaemia 21,865, scurvy 276 and diseases of the digestive system 165,437. Normal labour cases numbered 400; and abnormal cases 161, with 15 deaths. Cases of opium poisoning numbered 16 and other poisons 172. Surgical operations numbered 79,915.

To provide better medical aid for the rural population, a scheme was introduced under which dispensary medical officers were required to visit the nearest villages once or twice a week; the number of patients so treated was 19,579. The scheme for a sanatorium and a hospital for tubercular

Surgical operations totalled 2,620,296. Of these, 2,319,879 were performed in state-public, local-fund and private-aided hospitals and dispensaries; 119,298 in state-special and railway hospitals; and 181,119 in private non-aided institutions. Details are given in table IX (h).

TABLE IX (h).

	Classes I, III, IV.		Classes II, VI.		Class V.		Total.	
	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.
<b>British India</b>	263,001	2,319,879	127,185	119,298	161,636	181,119	2,552,417	2,620,296
N. W. F. P.	72,519	79,915	4,361	4,475	11,123	20,143	88,003	104,533
Punjab	527,846	540,736	37,666		5,284	4,677	570,796	574,299
Delhi	34,484	31,866	1,806	792			36,290	32,658
U. P.	311,745	325,610	12,313	19,078	19,137	23,108	343,194	367,796
B. & O.	281,440	289,910	11,022	9,956	32,501	34,717	324,963	334,577
Bengal	150,796	154,911	13,779	14,580	25,854	23,620	190,429	193,111
C. P.	98,114	102,361	4,760	4,371	7,340	6,675	110,223	113,407
Bombay	147,933	145,751	18,432	15,048	38,176	43,321	204,541	204,120
Madras	487,043		15,149	15,449	20,285	23,020	522,477	527,711
Coorg	3,048	4,090			30	31	3,682	4,121
Assam	20,701		1,156	1,301		477	22,244	23,271
Burma	111,464	118,727	5,915	4,568		606	118,011	123,901
Baluchistan	15,868	15,267	827	806	632	724	17,564	16,791

Total income of the state-public, local-fund and private-aided hospitals and dispensaries aggregated Rs. 4,06,37,047. This sum included Rs. 1,78,52,949 contributed by governments and Rs. 1,36,37,549 by local and municipal bodies. Expenditure on upkeep and maintenance amounted to Rs. 3,60,40,377. Total expenditure included Rs. 92,82,520 and Rs. 35,18,898 on account of the salaries of medical officers and of nurses.

Tables IX (i) and IX (j) give detailed figures for 1932.

TABLE IX (i).

	Total Income, classes I, III, IV.	Contributions by	
		Government.	Municipal and local fund.
	Rs.	Rs.	Rs.
<b>British India</b>	<b>4,06,37,047</b>	<b>1,78,52,949</b>	<b>1,36,37,549</b>
N. W. F. P.	6,57,757	4,05,957	2,10,851
Punjab	46,44,592	17,71,313	21,29,677
Delhi	6,29,698	2,58,543	2,23,298
U. P.	32,44,806	6,62,063	16,29,287
B. & O.	31,88,521	9,23,067	14,65,363
Bengal	68,00,185	19,53,465	24,32,481
C. P.	14,09,093	5,95,356	2,89,434
Bombay	57,44,912	27,59,530	19,64,371
Madras	80,92,375	57,84,437	15,08,239
Coorg	1,00,638	65,057	29,095
Assam	9,25,451	4,25,326	2,70,096
Burma	49,07,215	20,01,627	14,11,841
Baluchistan	2,91,804	2,47,208	13,516

TABLE IX (g).

	Influenza.	Dysentery.	Etiologic fever.	Gonorrhoea.	Syphilis.	Kala-azar.	Malaria.	Leprosy.	Relapsing fever.	Pneumonia.	Pyrexia of uncertain origin.	Tuberculosis of the lungs.	Other tubercular diseases.	Ankylosis of the joints.
British India .	792,556	1,191,797	73,691	289,268	343,343	127,012	11,032,686	81,083	6,200	191,105	1,493,811	160,771	84,398	154,356
N.W.F.P. .	8,084	19,946	1,136	1,364	6,408	..	438,210	54	33	6,289	11,682	3,669	3,443	426
Punjab .	27,461	174,062	20,848	13,008	18,446	86	1,876,203	725	401	45,308	66,583	14,070	19,185	1,976
Delhi .	106,236	12,057	1,055	6,101	7,732	12	130,770	63	13	8,238	3,787	8,455	3,308	108
U.P. .	50,861	138,028	7,355	25,566	38,700	653	1,013,805	7,013	412	24,872	151,002	19,214	10,640	1,200
B. & O. .	64,355	128,503	7,021	23,809	42,754	55,344	1,057,842	10,085	709	11,450	164,704	17,812	7,700	19,439
Bengal .	160,405	210,082	11,735	43,025	35,021	60,527	2,791,750	5,593	3,053	25,929	184,362	21,949	7,324	4,351
C.P. .	40,975	47,970	1,708	13,734	13,015	12	404,667	2,054	123	6,010	121,613	3,576	2,525	97
Bombay .	60,970	80,894	6,675	24,576	37,791	8	939,463	3,712	184	24,842	67,631	27,969	10,456	1,127
Madras .	135,740	394,209	13,338	98,951	104,230	6,519	1,031,368	46,749	1,141	31,448	578,389	40,896	13,210	122,405
Coorg .	7,883	4,854	56	933	202	..	108,715	1	..	2,198	1,938	75	39	1,378
Assam .	29,086	42,674	453	4,951	2,205	8,696	697,072	451	..	2,073	43,892	1,413	231	901
Burma .	24,705	30,232	1,481	22,444	30,524	160	333,114	2,793	92	5,635	69,467	5,191	1,772	945
Bahuchistan .	1,440	6,697	279	789	1,075	..	149,096	27	59	2,813	5,551	562	433	2

TABLE IX (f).

	Classes I, III, IV.				Classes II, VI.				Class V.			
	Indoor.		Outdoor.		Indoor.		Outdoor.				Total.	
	1932.	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.	1931.
British India . . . .	1,007,397	991,477	61,741,352	61,008,581	110,899	115,549	4,705,787	4,754,987	5,642,779	5,597,040	73,481,168	72,467,584
N. W. P. . . . .	26,348	26,122	1,498,633	1,295,745	8,641	9,033	123,413	153,129	96,798	77,789	1,748,103	1,559,815
Punjab . . . . .	191,278	186,695	12,615,457	12,239,039	9,303	10,403	1,305,387	1,379,480	109,284	117,080	14,233,657	13,982,897
Delhi . . . . .	18,155	15,777	955,232	953,447	1,519	1,447	31,225	20,974	..	..	1,016,121	994,645
U. P. . . . .	113,118	111,131	6,494,622	6,357,018	17,626	19,352	537,230	466,137	710,397	643,254	8,144,449†	8,096,922
B. & O. . . . .	66,557	65,321	5,914,809	6,152,351	8,698	9,236	363,317	383,316	895,242	977,355	7,550,133	7,587,129
Bengal . . . . .	102,325	101,146	7,092,588	7,146,993	25,122	24,225	692,741	604,315	1,586,144*	1,623,010	9,431,918	9,500,129
C. P. . . . .	34,035	33,291	2,996,003	2,931,850	5,139	5,147	214,227	216,187	253,909	250,761	3,405,513	3,467,226
Bombay . . . . .	104,534	110,623	3,680,440	3,897,436	8,699	9,279	452,615	431,224	1,943,744	1,110,918	5,440,332	5,569,455
Madras . . . . .	210,319	204,105	14,627,647	13,999,602	7,419	8,218	621,356	675,682	564,987	602,320	15,031,758	15,302,927
Coorg . . . . .	4,833	4,574	294,056	245,354	..	..	..	..	7,639	7,372	295,538	237,900
Assam . . . . .	15,739	15,079	2,232,321	2,152,942	4,972	5,146	126,430	116,395	88,836	76,015	2,313,298	2,365,577
Burma . . . . .	111,045	104,187	2,722,662	2,611,042	12,137	12,372	233,264	230,446	7,421	7,927	3,068,579†	2,905,974
Baluchistan . . . .	9,613	10,431	616,294	627,722	974	1,611	72,132	75,155	80,708	72,639	776,721	787,668

† Including 271,449 patients in subsidised dispensaries.

\* Excluding 87,532 cases not classified.

† Including 53,295 children in Classes I, III and IV (Indoor 3,509; outdoor 49,786).

The numbers of beds for females in general and women's hospitals and dispensaries of classes I, III and IV in some of the provinces are given in Table IX (d).

TABLE IX (d).

	General hospitals.	Women's hospitals.	Total.
<b>British India</b> . . . . .	<b>14,749</b>	<b>5,673</b>	<b>20,435</b>
N. W. F. P. . . . .	283	106	389
Punjab . . . . .	2,610	1,198	3,808
U. P. . . . .	1,008	1,521	2,542
B. & O. . . . .	1,228	209	1,437
Bengal . . . . .	1,865	403	2,268
C. P. . . . .	514	286	800
Bombay . . . . .	2,186	771	2,957
Madras . . . . .	3,188	1,047	4,235*
Assam . . . . .	301	..	301
Burma . . . . .	1,566	132	1,698

\* Including 329 in certain institutions of classes II and IV.

During the year, 73,481,163 persons sought treatment as compared with 72,467,584 in 1931. Of these 62,749,249 attended at state-public, local fund and private-aided institutions; 4,817,686 at state-special and railway hospitals and dispensaries; and 5,642,779 at private non-aided institutions as compared with 62,000,058, 4,870,486, and 5,597,040 respectively in 1931. Table IX (e) gives the totals of different groups of institutions at quinquennial intervals since 1911.

TABLE IX (e).

	Classes I, III, IV.	Classes II, VI.	Class V.	Total.	Patients treated.
1911 . . . . .	2,707	829	706	4,242	34,936,704
1916 . . . . .	3,051	872	688	4,611	42,291,098
1921 . . . . .	3,454	882	708	5,044	45,091,697
1926 . . . . .	4,189	919	614	5,722	53,064,623
1931 . . . . .	5,072	896	653	6,621	72,467,584
<b>1932 . . . . .</b>	<b>5,108</b>	<b>872</b>	<b>651</b>	<b>6,631</b>	<b>73,481,163</b>

Since 1911 the number of hospitals and dispensaries in British India has nearly doubled whilst the number of patients has increased by 110 per cent. During 1932, Madras and Punjab together contributed nearly 41 per cent. of the total. Compared with 1931, Madras recorded an increase of 638,801, Punjab 300,760, N. W. F. P. 188,288, Assam, 152,721, Burma 120,605, U. P. 47,520, Coorg 39,228, C. P. 36,387, and Delhi 21,476. Other provinces recorded decreases.

Table IX (f) gives provincial details.

Numbers of cases treated for some of the more important diseases are given in Table IX (g). Malaria alone was responsible for 16% of the total.

Of the total of 6,573 institutions in the various provinces, excluding Delhi and the agencies in the N. W. F. P., 4,639 were in rural and 1,934 in urban areas. Table IX (b) gives the distribution by provinces :—

TABLE IX (b).

	Classes I, III & IV.		Classes II & VI.		Class V.		Total.		Grand Total.
	R	U	R	U	R	U	R	U	
British India . . . .	3,689	1,345	427	427	488	162	4,639	1,934	6,573
N. W. F. P. . . . .	24	21	6	13	1	4	31	38	69†
Punjab . . . . .	588	186	130	93	3	4	721	253	974
U. P. . . . .	282*	209	17	85	42	19	341	313	654
B. & O. . . . .	452	73	42	41	55	12	549	126	675
Bengal . . . . .	766	178	63	50	188	37	967	274	1,241
C. P. . . . .	128	101	13	36	31	18	172	155	327
Bombay . . . . .	159	256	29	53	145	35	332	344	676
Madras . . . . .	981†	186†	49	31	59	31	1,089	248	1,337
Coorg . . . . .	9	2	..	..	3	..	12	2	14
Assam . . . . .	168	38	23	21	7	..	198	59	257
Burma . . . . .	136	92	47	23	..	2	183	117	300
Baluchistan . . . .	32	3	8	2	4	..	44	5	49

\* Including 35 rural subsidised dispensaries.

† Including subsidised dispensaries.

‡ Excluding 31 institutions in the agencies.

Available beds totalled 69,835, of which 45,227 were for males and 24,608 for females, as compared with 44,525 and 24,252 respectively in 1931. 54,823 beds were provided in state-public, local-fund and private-aided hospitals and dispensaries; 8,350 in state-special and railway hospitals; and 6,662 in private non-aided institutions. 85 per cent. of the beds for females were in classes I, III and IV institutions. Table IX (c) gives details for the different provinces.

TABLE IX (c).

	Classes I, III and IV.		Classes II and VI.		Class V.		All classes.		
	M.	F.	M.	F.	M.	F.	M.	F.	Total
British India . . . .	33,999	20,824	7,889	461	3,339	3,323	45,227	24,008	69,835
N. W. F. P. . . . .	786	389	642	..	175	101	1,603	490	2,093
Punjab . . . . .	5,281	3,808	805	55	46	87	6,132	3,950	10,082
Delhi . . . . .	268	495	54	1	..	..	322	496	818
U. P. . . . .	4,156	2,542	1,402	62	267	248	5,825	2,850	8,675
B. & O. . . . .	2,668	1,437	741	65	478	348	3,827	1,850	5,737
Bengal . . . . .	4,032	2,268	1,828	111	634	305	6,494	2,684	9,178†
C. P. . . . .	1,320	800	314	6	115	252	1,749	1,058	2,807
Bombay . . . . .	4,217	2,957	472	45	945	716	5,634	3,718	9,352
Madras . . . . .	5,173	3,906	336	41	603	1,148	6,112	5,065	11,207
Coorg . . . . .	88	66	..	..	..	..	88	66	154
Assam . . . . .	777	301	447	44	50	30	1,274	375	1,649
Burma . . . . .	4,815	1,698	753	26	8	86	5,581	1,810	7,391*
Baluchistan . . . .	418	157	90	5	18	4	526	166	692

\* Excluding 122 beds for children and 16 special beds.

† Excluding 155 beds at Ranaghat C.M.S. Medical Mission at Dayabari and New Zealand Baptist Mission at Chandpur.

## SECTION IX.

## MEDICAL INSTITUTIONS.

## I.—Hospitals and Dispensaries.

## A.—British India.

143. *General and Statistical.*—In British India,\* at the end of 1932, 6,631 hospitals and dispensaries were available for a population of over 271 millions, as against the revised figure of 6,621 in 1931. These included 5,108 state-public, local-fund and private-aided institutions (5,072 in 1931), 872 state special and railway (896 in 1931), and 651 private non-aided hospitals and dispensaries (651 in 1931). 152 new institutions were opened, 118 were closed and 24 were transferred to other classes or departments. These figures mean that there was one dispensary for every 41,000 persons, the average varying between one for 74,020 persons in the U. P. and one for 9,459 in Baluchistan. Provincial details are given in Table IX (a):—

TABLE IX (a).

	Classes I, III, IV.		Classes II, VI.		Class V.		Total.		Average popula- tion served per insti- tution.
	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.	
British India . . . .	5,072	5,108	896	872	653	651	6,621	6,631	40,859
N. W. F. P. . . . .	57	59	35	35	5	6	97	103	24,251
Punjab . . . . .	782	774	210	193	9	7	1,001	974	24,210
Delhi . . . . .	22	25	2	2	1	..	25	27	23,565
U. P. . . . .	473	491	104	102	60	61	637	654	74,020
B. & O. . . . .	520	525	85	83	67	67	672	675	55,819
Bengal . . . . .	921	944	122	122	176	175	1,219	1,241	40,382
C. P. . . . .	234	229	51	49	52	49	337	397	47,424
Bombay . . . . .	414	414	82	82	179	180	675	676	32,442
Madras . . . . .	1,169	1,167	80	80	88	90	1,337	1,337	34,959
Coorg . . . . .	11	11	..	..	3	3	14	14	11,669
Assam . . . . .	203	206	44	44	7	7	254	257	33,550
Burma . . . . .	232	228	71	70	2	2	305	300	48,891
Baluchistan . . . .	34	35	10	10	4	4	48	49	9,459

## Abbreviations—

M. . . . . Male.

F. . . . . Female.

R. . . . . Rural.

U. . . . . Urban.

p.m. . . . . Per mille.

C. P. . . . . Central Provinces and Berar.

U. P. . . . . United Provinces of Agra and Oudh.

B. &amp; O. . . . . Bihar and Orissa.

Class I.—State-public.

Class II.—State-special.

Class III.—Local, municipal fund and subsidised dispensaries.

Class IV.—Private-aided.

Class V.—Private non-aided.

Class VI.—Railways

\* Excluding Aden (see page 278).



carried out in chronic cholecystitis, duodenal ulcer, gastric ulcer, pernicious and other anæmias and in cancer of the stomach.

138. *Anthropometric measurements in Bombay at the Seth G. S. Medical College, Bombay.*—This enquiry was conducted by Dr. Kurulkar. Measurements of male and female individuals of different communities were being undertaken but complete results have not yet been obtained.

139. *Bio-chemical and spectroscopic enquiry in medical research.*—This enquiry was conducted by Lt. Col. Boyd, I.M.S. in Calcutta in continuation of the work done in the previous year. The new lines of research included : (1) quantitative spectroscopic analysis in regard to (a) estimation of lead in urine, and (b) estimation of manganese in human organs and common Indian food stuffs ; (2) use of the spectroscope in medico-legal problems ; (3) absorption spectrography as regards (a) cocaine substitutes, (b) alkaloids and (c) pathological sera ; and (4) X-ray analyses by the Debye and Sherers powder photographic method. Diffraction patterns were taken of Russell's viper venom and cobra venom.

140. *Flora and fauna of the water supplies of the Madras Presidency.*—This enquiry was conducted by Lt.Col. King, I.M.S. at the King Institute, Madras. Various water supplies in Madras and in the Presidency were surveyed and lists of the species found tabulated. In addition to the surveys, experiments were conducted to ascertain the length of life of the commoner species found and to estimate the amount of debris each species produced on its death. Experiments with copper sulphate were also carried out in regard to the minimum lethal dose necessary for different species.

141. *Statistical enquiry.*—This was carried out by the Public Health Commissioner with the Government of India in continuation of work done in previous years. Statistics for (a) respiratory diseases, (b) dysentery and diarrhoea, (c) seasonal smallpox mortality, and (d) fever mortality, were collected and a series of maps, charts and graphs prepared.

142. *Special grants.*—(i) A grant of Rs. 66,817 was made to the Calcutta School of Tropical Medicine to meet the pay of the Professors of Pathology and Bacteriology and of Protozoology and Entomology. (ii) A sum of Rs. 19,600 was contributed towards the pay of Dr. E. Muir, M.D., as Director of Leprosy Research. (iii) A sum of £100 was contributed to the Imperial Institute of Entomology, London. (iv) A sum of £150 was contributed to the Bureau of Hygiene and Tropical Disease, London. (v) Rs. 700 was provided for the I. R. F. A. library, Central Research Institute, Kasauli, for the purchase of books and journals and (vi) A grant of Rs.15,000 was made to the Medical Research Society, Assam.

disease was continued. Research was also carried out in connection with certain synthetic antimalarial remedies, the chief among these being (a) a derivative of narcotine (cotarnine-resorcin compound), prepared at the instance of the Central Board of Revenue, Government of India, and (b) the new antimalarial remedy from Germany named 'atebrine.'

The work done in connection with this indigenous drugs enquiry together with other important work on the Indian indigenous drugs has been collected in book form, under the title "The Indigenous Drugs of India, their medical and economic aspects." This volume contains a summary of all the recent work in addition to the references to the old literature. A comprehensive glossary containing 2,500 drugs has been attached giving their important vernacular names, common uses and the active principles. During the year 11 papers were published in the I. M. G. and I. J. M. R.

134. *Drug addiction enquiry at the Calcutta School of Tropical Medicine.*—This was also under the direction of Lt.-Col. Chopra, I.M.S. In spite of retrenched staff it was possible to complete a detailed study of the opium habit in the Punjab. The investigation of addiction to chloral hydrate was also completed. A further enquiry was started in regard to the incidence of drug habits and the physical, mental and moral effects produced by them among different populations in India.

135. *Skin diseases enquiry at Calcutta.*—This enquiry was, as before, under the direction of Lt.-Col. Acton, I.M.S. The following lesions of the skin surface have been studied: (1) *Pityriasis rubra* and (2) *Tinea cruris*. The effects of the different oils on two fungi, *Tinea Cruris* and *Malassezia ovale* have been also studied in detail. The difficult question of the classification of actinomycoses was also dealt with.

136. *Blood changes in tropical diseases at the Calcutta School of Tropical Medicine.*—This enquiry was conducted by Lt.-Col. Lloyd. The work on complement fixation in filariasis was completed and published in the April, 1933, number of the I. J. M. R. which may be consulted for details. Lt.-Col. Lloyd also worked during the year on serum protein fraction variations and a paper on the results obtained was under preparation for the I. J. M. R.

Weekly and later fortnightly examinations of the protein fractions of the serum of a buffalo under immunization against plague by the new Bombay process were also carried out for ten months. The only change observed was a slight rise of the euglobulin. Results communicated by the Haffkine Institute, Bombay, indicated that the serum of this animal showed definite evidence of protective action against plague infection but it was difficult to assess the significance of a very small protein change in the blood of a single animal.

About a thousand Wassermann tests were carried out to examine the reaction in relation to birth, this being a combined clinical and serological study of a comprehensive kind. It was proposed to publish a paper on the subject at a later date.

137. *The secretion and composition of gastric juice in Indians* at the Physiological Laboratory. Grant Medical College, Bombay. This enquiry was continued by Major Bhatia, I.M.S. Complete gastric analyses have been

*Maternal mortality and morbidity in child-birth.*—This enquiry was conducted by Dr. Mudaliar of Madras. Investigation was continued into the incidence of pernicious anæmia of pregnancy in the general population in the city of Madras and in the hospitals, according to age, parity and caste. Important clinical features in their relation to other anæmias complicating pregnancy and toxæmias of pregnancy were studied. Biochemical investigations in regard to the blood chemistry and gastric analysis were also made. Other forms of tropical macrocytic and microcytic anæmias were under investigation.

*Osteomalacia (late rickets) in the Punjab.*—This enquiry was conducted by Dr. Dagmar Curjel Wilson. Experimental evidence, according to Dr. Wilson, supported the conclusion that late rickets and osteomalacia could be prevented or mitigated by diet or by an adequate supply of vitamin D, calcium and phosphates and Dr. Wilson's work has led to certain methods of prevention and early treatment being established in the Punjab through the agency of the Red Cross. These methods of prevention were conducted both in urban and rural areas and included medical inspection, treatment and health instruction in addition to village propaganda on the prevention and causation of bone diseases and on the importance of early treatment.

*Physiological anæmia during and after pregnancy.*—This enquiry was conducted by Dr. Khanolkar, Professor of Pathology and Bacteriology, Seth G. S. Medical College, Bombay. The total cases studied amounted to 229. From a rough study of these there appeared to be a mild but definite anæmia during pregnancy but the course of changes in the blood picture was not always the same.

### Miscellaneous.

131. *Indian Simuliidae, culicoides and other blood sucking midges.*—This enquiry was carried out by Dr. Puri. A study of Indian specimens has shown that the species belonged only to two subgenera of *Simulium*, namely, *Simulium* and *Eusimulium*. Specimens were collected in Lahore, Jhelum, Rawalpindi, Peshawar and the Khyber Pass and an examination of these showed that *S. equinum* and *S. paraequinum* were the predominating species north of Rawalpindi. A study of the whole material available showed 45 different species of which males or females of only 15 species had been described previously.

132. *Trypanosomide enquiry under the Director, Pasteur Institute, Kasauli.*—The work of this enquiry comprised the examination of a large number of selected species of birds and attempts to work out the life-history of its trypanosome parasite including the methods of transmission. The details of the work may be briefly summarised under the following headings: (a) observations on the parasite in the bird and (b) observations on the parasite in blood-sucking insects, such as mosquitoes and sandflies.

133. *Indigenous drugs enquiry at the School of Tropical Medicine, Calcutta.*—This was under the direction of Lt.-Col. Chopra, I. M. S. During the year it was possible to complete investigations on a number of drugs used in indigenous medicine. A study of the pharmacological action of the venom of Indian *dabota* was also begun and its action on the protozoa worked out. Work on the changes in the physical properties of blood sera in health and

*Filariasis enquiry at the Calcutta School of Tropical Medicine.*—This enquiry was under the charge of Dr. Sundar Rao. His investigations included (a) dermal tests for the detection of filarial infection, (b) etiology of hydrocele, (c) experimental work with *Filaria bancrofti*, and (d) guinea-worm infection.

### Maternal Mortality.

130. *Pernicious anæmia of pregnancy enquiry at the Haffkine Institute, Bombay.*—This enquiry was conducted by Dr. Lucy Wills. The object of the work was firstly to fractionate 'Marmite' with reference to the factor curative in tropical macrocytic anæmia and secondly, to investigate the curative action of certain Indian yeasts with a view to securing a cheaper supply of this curative factor.

Through the kindness of Professor Jansen of Amsterdam and Dr. Chick of the Lister Institute, London, supplies of vitamin B from sources other than yeast were obtained.

It was possible to demonstrate that untreated yeast is practically valueless in the treatment of these macrocytic anæmias and that the vitamin B complex is not the active factor in marmite. This is a water and alcohol soluble compound or compounds present in marmite, possibly a protein breakdown product, the result of autolysis.

*Anæmia in women in Assam tea gardens.*—Dr. Margaret Balfour made a tour through a number of tea gardens in Assam in order to study the nature of the anæmia which was common there among women, especially that in connection with pregnancy, and to advise as to possible measures of prevention. Her conclusions may be summed up as follows: (1) *Anæmia*: Although anæmia is more common and more fatal among pregnant women it is also, apart from pregnancy, extremely common among coolies of both sexes and many deaths occur from this cause. (2) *Malaria*: The connection between malaria and anæmia should be tested by noting the number of deaths from pregnancy anæmia (a) in gardens with high and low spleen rate, (b) in gardens where determined efforts have been made to reduce malaria, and (c) by noting the number of malarial and anæmic cases treated in successive years. (3) *Hookworm*.—The incidence of hookworm in the gardens was said to be from 70 to 90 %, but no exact measures have been taken to check this figure. Although it was customary to treat those showing low hæmoglobin content, it was clear that many who were infected never, however, became anæmic. (4) *Diet*: Neither wheat nor millet is grown in Assam and the staple diet is rice. When one considered the diets usually available and their possible effect in producing nutritional disease, one could only say that they were poor in all vitamins. An interesting observation was that in one garden where anæmia was increasing the quality of the rice had deteriorated in recent years, the admissions for anæmia being 880 in 1931 and 1,556 in 1932. (5) *Castes and communities*: Dr. Balfour recommended an enquiry into this question which should go hand in hand with the enquiry into diet. Her proposals for future investigation of the anæmia problem in the tea gardens of Assam included: (a) a field investigation of the different types of anæmia, (b) a dietetic enquiry with reference to the causes of anæmia, and (c) a classification and comparison of the results of the dietetic experiments initiated.

tions carried out during the year have been reported under the following headings :—(1) urinary calculus, (2) mineral metabolism, (3) iodine-determination, (4) hydrogen-ion concentration, (5) insanitary condition, food, vitamin D, sunlight and goitre, (6) tissue culture and (7) spectrography. Additional observations were made on (1) the effect of vitamin B. deficiency on the heart's action, (2) nickel in nutrition, (3) the interaction of food and insanitary condition in causing endocrine disturbance, and (4) supposed beri-beri producing 'toxins' in rice. Eleven papers were published during the year and 7 others were in the press.

### Tuberculosis.

127. *Tuberculosis enquiry at the Haffkine Institute, Bombay.*—This enquiry was under the direction of Dr. Soparkar. Details of the work done have already been given under the heading "Haffkine Institute, Bombay" on page 231 of this report.

*Tuberculosis enquiry at Calcutta.*—This enquiry was carried out under the direction of Dr. Ukil and the work included (a) typing of tubercle bacilli obtained from extra-pulmonary lesions in man, (b) the role played by natural sunlight in the production of immunity, if any, in tuberculosis, (c) the histopathology of lung tuberculosis in India and (d) an investigation into certain aspects of epidemiology of the disease, such as the influence of contact and infective dosage on allergy in tuberculosis, marital influences, etc.

### Vaccines.

128. *Anti-rabic vaccine enquiry at the Pasteur Institute of India, Kasauli.*—This enquiry was continued by Lt.-Col. Shortt, I.M.S. and the work included immunisation experiments: (a) human tests, and (b) animal tests. Other experiments were done to test (a) the post-infectious immunising value of immune serum as an adjunct to vaccine treatment, as well as to determine if it has any value when used alone, (b) the duration of immunity in immunised animals and (c) the post-infectious value of various chemical agents in preventing rabies.

### Helminthology.

129. *The helminthological enquiry at the Central Research Institute, Kasauli,* was under the direction of Dr. Korke who continued to add to the helminthological collection of specimens in the Institute. Identification of new specimens was carried on and further helminthological literature was indexed. Research work included an investigation into filariasis, particularly to ascertain the factors concerned in contrast with the conditions found in endemic areas.

*Helminthological enquiry at the School of Tropical Medicine, Calcutta.*—This enquiry was continued by Dr. Mapleston. Amongst other investigations he was engaged in improving the methods of culturing larvæ; in investigating pharmacologically, in conjunction with Lt.-Col. Chopra's department, a new anthelmintic, hexylresorcinol; and in investigating the skin lesions caused by hookworms, especially the larvæ of *Ancylostoma braziliense*.

Other lines of investigation which had produced no very definite results included (a) reticulo-endothelial blocking experiments with rabbits to make them susceptible to leishmania infection, (b) comparative 'opsonic' experiments with flagellate cultures and washed blood cells from kala-azar patients, malarial patients and normal individuals, (c) the histological examination of the skin in cases of kala-azar and dermal leishmaniasis, (d) intra-dermal injection of dyes, Indian ink and leishmania cultures followed by skin section of the part injected, (e) the maintenance of the plasmodium infection in the *Macaca mulatta* (rhesus) and *Macaca irus* and (f) treatment of kala-azar, post-kala-azar dermal leishmaniasis and oriental sore by a vaccine.

The second report of the Kala-azar Commission, prepared by Lt.-Col. Shortt, was published during the year. This report contained an introductory chapter summing up the position with regard to transmission of kala-azar, a short resumé of all the papers published by members of the Commission since the publication of their first report and a number of papers not previously published reporting details of the Commission's work.

*Leishmania vaccine enquiry.*—This enquiry under Dr. Ray was continued at the Central Research Institute, Kasauli. Studies on the cultivation, morphology, serology and vaccine treatment of leishmania were continued.

*Histology of kala-azar and splenomegalic conditions in Bengal and Medical College, Calcutta.*—This enquiry was under Dr. De and the work was confined mainly to completing the research on the incidence of splenomegaly in Bengal, although a distribution of the *Leishmania donovani* in various parts of the human body was also investigated. The morbid anatomy and histology of the liver and spleen in cases of Leishmaniasis has also been discussed in a paper which has been published. The investigation into the pathology of the peculiar type of splenomegaly mentioned in Dr. De's previous reports was being continued.

### Leprosy.

125. *Leprosy enquiry.*—This enquiry was conducted by Dr. Muir and Dr. Lowe. For several years until the end of 1931-32 the I. R. F. A. made grants for leprosy research in the School of Tropical Medicine under four heads, one towards the cost of the leprosy department and three other special grants. The special grants were discontinued at the end of 1931-32, their cost being met by the B. E. L. R. A. (Indian Council), but the general grant is still continued. The work done in the leprosy department of the School of Tropical Medicine was carried out under the following heads:—(a) treatment, (b) bacteriology and pathology, (c) rat leprosy, (d) cytological studies, (e) bacillæmia, (f) rat leprosy experiments, (g) cultural experiments and (h) miscellaneous, including a considerable amount of field investigation. A special investigation of a series of cases treated by the methods described by Dr. Muir and a full report and discussion of the findings has been published in the International Leprosy Journal.

### Nutrition.

126. *Nutritional research at Coonoor.*—This work remained under the direction of Colonel McCarrison and his assistants. The results of the investiga-

Cumbum town which had been regularly infected with plague since 1921. Cyanogas 'A' dust was the material selected for fumigating 11,948 rat burrows in 2,210 houses. It was perhaps premature to dogmatise in regard to the effects of rat-burrow fumigation against endemic plague but it was noted that Cumbum town had passed through one or two months of the usual plague season without having had a single case of plague in spite of the fact that every village and hamlet around Cumbum had severe infection.

### **Cholera and Bacteriophage.**

123. *Bacteriophage enquiry*.—This enquiry was conducted in Patna by Dr. Igor N. Asheshov. The work was a continuation of that carried out in previous years and his results have been incorporated in three papers which appeared in the April, 1933, issue of the I. J. M. R. The basic research work carried out under Dr. Asheshov and his assistants was highly technical and the original papers must be consulted for a proper appreciation of their investigations. These were specially devoted during the year to (a) composition of the media and (b) the practical application of choleraphage in the field, both in regard to its therapeutic and its preventive value and to its use as a controlling agent of outbreaks of the disease.

*Cholera bacteriophage in Assam*.—This enquiry was carried out under the direction of Lt.-Col. Morison, Pasteur Institute, shillong. To supervise this work and to assist in further epidemiological studies the Royal Society of England granted to the Assam Medical Research Society £2,125 towards the salary of Dr. Rice, the research worker, and his assistants. Here again it has been found impossible to summarise in any brief form the highly technical work which has been done. Field tests were carried out by distribution of phage to village in certain areas and since June over 150,000 doses of bacteriophage were so distributed, while 8,264 cases of dysentery and diarrhoea and suspected cholera have been treated. This work was being continued.

*Cholera enquiry under Dr. Linton*.—This enquiry has worked upon the antigenic structure of *Vibrio cholerae* and related organisms with special reference to carbohydrates. The results obtained have been published in the July, 1932, number of the I. J. M. R.

### **Kala-Azar.**

124. *Kala-azar enquiry at Calcutta*.—This enquiry was continued at the School of Tropical Medicine under Dr. Napier. Dr. Smith was in charge for a period of four months when Dr. Napier was absent on leave. The work of the enquiry has been reported on under the following heads: (1) sandfly transmission experiments, (2) the degree of the susceptibility of hamsters, (3) cytological studies, (4) the anaemia of kala-azar, (5) the susceptibility of *Maca-cairus* to kala-azar, (6) hypo-adrenia and leishmania infection and (7) infection of sandflies from dermal cases. In addition, an investigation of kala-azar in Madras was carried out and various interesting observations were made not only in Madras city but in outlying infected areas.

ii. *The serum therapy of plague* was carried out by Dr. Naidu and Dr. Wagle. This work included (a) the production of anti-plague serum, (b) potency tests in rabbits, (c) concentration of serum, and (d) treatment of human plague cases by serum. In connection with the last it is interesting to note that 10 plague cases, biologically confirmed, were treated with serum prepared in the Institute. Two were mild septicæmic and 8 severe septicæmic cases, only 1 showing a mild degree of septicæmia recovered. Five other cases where diagnosis was not bacteriologically confirmed, but which clinically appeared to be plague, were treated with the serum and all recovered.

iii. *Epidemiology of plague*.—This work included investigations into the comparative immunity of rat populations. Experiments were also devised to demonstrate whether rats from places showing varying degrees of incidence of plague would show differences in regard to flea infection under conditions suitable for carrying out artificial epizootics. These were being continued as definite conclusions had not been reached.

iv. *Chemotherapy of plague*.—This was carried out by Lt.-Col. Taylor and Dr. Wadia. Previous experiments with various halogenomercuriphenols had shown that these compounds did not possess any higher germicidal value than mercuric chloride. A series of experiments to determine how toxicity values compared were carried out and these showed that, injected either subcutaneously or intravenously, the halogenomercuriphenols were 3—7 times less toxic than mercuric chloride. The results obtained from the continuation of this work were not deemed sufficiently encouraging and a further investigation into the use of these compounds was discontinued. Two patent drugs Merthiolate and Salyrgan were given trials for the treatment and cure of plague.

B. *Rat flea survey, Rangoon river area*.—This survey was continued under the direction of the Director of Public Health, Burma, and completed the investigation which had been going on for a period of five years. A study of the results obtained in the five surveys which were (1) the port area, (2) the central and Pazundaung area, (3) the municipal area, (4) barges and (5) steamships, showed that the rat and flea distribution varied in each area. The present survey was carried out with a view to ascertaining the varieties of rats and rat-fleas to be found in steam ships arriving at and departing from Rangoon port. 1,030 rats were caught and examined. The species were: *R. rattus* 86.41 %, *R. norvegicus* 5.15%, *M. musculus* 5.82%, *N. bengalensis* 1.84%, *M. concolor* 0.68% and *C. cærulea* 0.10%. As regards fleas, *X. cheopis* and *X. astia* were the only two species found, the former being 80.85% and the latter 19.15% of the total.

C. *Plague recrudescence enquiry in the Cumbum Valley, Madras Presidency*.—This enquiry was conducted by Dr. George, research health officer, under the supervision of the Director of Public Health, Madras, and the Director of King Institute, Madras. The work included (a) an examination of rats and fleas during the off-season. Since the commencement of this enquiry 921 field rodents were examined and from them 1,320 fleas were collected. *X. astia* is the predominating flea, *X. cheopis* being obtained only from specimens caught from the villages; (b) an experiment to observe the longevity of starved fleas; (c) an experimental study of the effects of fumigation of rat burrows in combating endemic plague. This experiment was conducted in



the Calcutta School of Tropical Medicine. A mass of data has been obtained which required investigation ; various findings of interest have already emerged, but for details reference must be made to the paper on the subject.

A survey of the anopheline fauna and of malaria in Patna city was carried out. A complete absence of *A. stephensi* was noted, although conditions for its breeding seemed eminently suitable.

Other work on monkey malaria has been carried out, details of which will be found in the June, 1932, number of the I. M. G. A paper in the August number of the same magazine has reported on clinical studies in malaria by cultural and enumerative methods.

*Anopheline survey of Assam.*—This was carried out under Lt.-Col. Morison, Director of the Pasteur Institute, Shillong. Collections have been made in 24 stations from 9 districts and identifications carried out. The commonest species found were *A. minimus* and *A. maculatus*.

Field experiments were undertaken to investigate the value of plasmoquine in reducing malaria. No anti-larval measure was undertaken. Figures showed reduction in the malaria and total sick and in benign and quartan infections. Field experiments with plasmoquine were also conducted.

*Malaria in Calcutta.*—Dr. Strickland investigated some factors pertaining to the incidence of malaria in Calcutta. Strickland and Roy have investigated the sporozoite-rate of *A. stephensi* in Calcutta month by month.

*Malaria in Assam.*—A contribution of Rs. 15,000 was made to the Assam Medical Research Society by the I. R. F. A. for a malaria enquiry. This grant was supplemented by a grant from the Government of Assam of Rs. 25,000 and Rs. 7,500 from various industries of Assam. These grants enabled a malaria research officer and staff to be appointed and the object of the enquiry was to obtain reliable information on malaria for the whole of Assam province. The research officer worked in close touch with the Public Health Department, the tea gardens, the oil field and the railway and the usefulness of the enquiry has been increased by the appointment of a provincial malaria committee. By scrutinising and co-ordinating surveys carried out by the medical officers of the province, it was hoped to obtain a complete survey which would throw light on the anomalies of malarial intensity and particularly on black-water fever.

### Plague.

122. A. *Plague researches at the Haffkine Institute under the Director* included (i) Plague vaccine work by Major Sokhey and Dr. Maurice. This work was concerned with (a) the effect on virulence of growth of *B. pestis* in broth, agar and blood agar at 27°C and 37.5°C ; (b) the effect of temperature of incubation on the growth of *B. pestis* in broth ; (c) changes introduced into the biological method for the standardisation of anti-plague vaccine ; (d) the importance of using an accurately measured infecting test dose ; (e) the relative value of the constituents of the Haffkine prophylactic vaccine ; (f) the reaction of the medium ; and (g) the relationship of virulence of *B. pestis* to toxicity and immunising value of the resultant plague vaccine.

by means of spleen and parasite rates in different areas. Other experiments included the value of different diluents for paris green, the value of different meshes of wire gauze, and the use of anti-larval fish such as *Gambusia*.

(f) *Entomological*.—Capt. Barraud completed his revision of the *Culicine* mosquitoes of India and has described 244 species and a large number of larvae, many of which were previously unknown.

Observations on the seasonal prevalence of anophelids in relation to malaria in the Karnal district have been continued. A new variety of *A. aitkeni* was described by Capt. Barraud. Barraud's box for sending mosquitoes through the post continued to prove very successful and various new varieties of mosquitoes have been identified from material sent in these boxes.

A diagnostic table has been published for the 27 species and 6 varieties of *Phlebotomus* recorded in India. A table for the identification of the males of the Indian species was almost completed. Another research in progress was concerned with the bionomics of Indian anophelines.

(g) *Quinine therapy*.—A research into the harmful effects of intramuscular and subcutaneous injections of quinine has been carried out and a paper giving the results obtained was under preparation for the Records of the Malaria Survey of India.

(h) *Monkey malaria*.—Considerable time has been devoted to this question. Work has been carried out in many directions, such as (1) strains of parasite, (2) classification of parasites, (3) species, (4) mixed infections, (5) immunity to superinfection, (6) diagnostic tests, (7) latent infections, (8) cultivation of parasites, (9) blood changes, (10) chemical composition of malarial pigment, (11) clinical and pathological observations, (12) mosquito transmission and (13) transmission of human malaria to monkeys.

(i) *Bird malaria* experiments were in progress.

*Malaria treatment centre at Kasauli*.—This centre was partly financed by the I. R. F. A. and partly by the Director, Medical Services in India; the Director, Malaria Survey of India, acted as adviser. Investigations on the therapeutic value of quinine, plasmoquine and atabrin in chronic relapsing cases of B. T. M. and of atabrin in relapsing cases of M. T. and Q. were carried out. Various standardised treatments were introduced. One conclusion reached was that atabrin exhibited alone or followed by a short course of plasmoquine afforded a valuable addition to the present methods of treatment of malaria.

*Malaria transmission enquiry*.—This enquiry was carried out by Lt.-Col. Knowles at the Calcutta School of Tropical Medicine. The air-conditioning cabinet mentioned in last year's report was in constant use and five experiments have been carried out with fed batches of *A. stephensi* exposed to conditions representing those of the Calcutta cold, spring, hot weather, monsoon and post-monsoon seasons. A paper on this subject has appeared in the January 1933 number of the I. J. M. R. It was hoped to carry out further experiments with other Indian transmitting species of anophelines after the experiments with *A. stephensi* were completed.

During the last four years observations have been made into the density of breeding of *A. stephensi* month by month in an area one square mile around

Covell proceeded on leave from 10th October on which date Capt. H. W. Mulligan, I.M.S., joined as Assistant Director. Capt. P. J. Barraud held the post of Entomologist. Other members of the staff included: Rai Sahib Khazan Chand, Rai Sahib Subedar J. D. Baily, Jemadar Vidya Prasad, Jemadar Abdul Majid and Jemadar Harbhagwan. Mr. N. D. Kehar, Chemist, was awarded a fellowship under the Rockefeller Foundation and left for America on 5th September and Dr. Ghosh, an honorary worker, was employed for the period of Mr. Kehar's absence. The sanctioned posts of two research workers and a malarial engineer were held in abeyance due to financial stringency. This reduction of staff seriously curtailed research activities.

Various modifications and improvements in the buildings have been made both at Kasauli and the Ross Field Experimental Station, Karnal. A new aquarium has been constructed for the observation of indigenous larvicidal fish.

Their Excellencies the Viceroy and the Countess of Willingdon visited the laboratories of the Malaria Survey at Kasauli on 9th July, 1932.

(b) *Classes and Instructional work.*—The annual malaria class was held at Karnal from 14th March to 23rd April. Fifteen students attended of whom 12 passed the examination. Three malaria assistants were also trained in the collection and identification of anophelines, the dissection of mosquitoes and other practical field work.

The Director continued to act as Editor of the Records of the Malaria Survey of India. The library on malarial subjects has been largely augmented by purchase, gifts and exchange.

(c) *Entomological collections.*—Numerous requests were received from India and elsewhere for identification of collections of mosquitoes and sand-flies. The reference collections of these have been considerably augmented and many workers have been supplied with specimens of Indian species for comparison and for teaching purposes. The specimens in the collections have formed the material from which Sir Rickard Christophers has written the Anopheline volume for the "Fauna of British India" series. Capt. Barraud has similarly studied the Culicines for the corresponding volume on this family.

(d) *Sind Malaria Enquiry.*—Extensive investigations have produced valuable data from which it should be possible to evaluate the effects of the Sukkur barrage scheme on the incidence of malaria in Sind. Pre-irrigation conditions have been recorded in certain areas and in order to ascertain the effect of irrigation, the sub-soil water level in a number of wells was measured monthly. An investigation into the relationship between the seasonal prevalence of the different species of parasite and seasonal outbreaks of malaria was being made.

Entomological surveys have been carried out in several areas in Rajputana, in Patiala State, Karnal and in Assam.

(e) *Anti-malarial measures.*—Extensive experiments have been carried out in Sind in regard to the utility and cost of paris green as an anti-malarial measure for small towns and large villages. This work was controlled by daily anopheline catches and by monthly spleen and blood examinations of the village children. The effects of anti-larval measures were also being observed

hydrocyanic acid with its salts. Poison was detected in 179 of the 536 samples said to be vomited matter or excreta with or without accompanying viscera. 3,386 stain cases were analysed.

**Bombay.**—4,376 medico-legal examinations were carried out and 929 cases were investigated, including 445 of suspected human poisoning, 411 stain cases, 40 suspected animal poisoning and 33 miscellaneous. Other examinations included 39 samples of water, 3,570 for the excise department, 421 for government stores and 331 miscellaneous. Amongst the 445 suspected human poisoning cases, poison was detected in 239, with 112 deaths, opium being present in 126, arsenic in 25, *dhatura* in 28 and other poisons in 60. As regards animal cases, poison was detected in 18, yellow oleander (*Cerbera thevetia*) in 8, arsenic in 9 and *Nux vomica* in 1; 34 cases were fatal. Reports were made on 315 samples of *ghee*, milk, flour, sugar and limejuice, 23 medicines and chemicals; and 3 others.

**Madras.**—1,437 cases, comprising 6,136 articles were received for analysis, including 323 for human poisoning, 38 for animal poisoning, 816 for stains and 62 miscellaneous. Poison was detected in 168 human poisoning cases or 52% of the total. Opium, arsenic, mercury and oleander were the commonest poisons detected. Of the animal poisoning cases, 23 or 60% were positive; the common animal poisons were oleander 12 cases and arsenic 7 cases.

**Burma.**—8,044 examinations were made, and the number of medico-legal cases was 1,559. Of 365 cases of suspected human poisoning investigated, poison was detected in 195, the most common being opium, arsenic and *dhatura*. As usual, opium figured largely in suicidal cases and arsenic in homicidal cases; *dhatura* was used by thieves as a stupeficient.

#### Indian Research Fund Association\* (I. R. F. A.).

120. The following is a brief summary of the salient points of the investigations undertaken by workers of the Association during the financial year 1932-33. In order to obtain details, however, reference must be made to the reports published in the I. J. M. R., in its Memoirs and in the Records of the Malaria Survey of India,—the organs for publication of the work of the Association,—in the I. M. G. and other papers. A detailed list is given in the appendix to this section (page 386). A short resume of the different investigations will also be found in the published report of the S. A. B. of the I. R. F. A.

In previous reports the nature of these investigations has been indicated in some considerable detail; but, in view of the report of the S. A. B. being now available as a priced publication, it has seemed sufficient to outline the work of each enquiry in the hope that those interested will consult the report of the S. A. B. or reprints of the original articles.

121. *Malaria Survey of India : (a) General.*—Lt.-Col. J. A. Sinton, V.C., I.M.S. resumed charge as Director on return from leave on 4th April. Major

\*The report of the Scientific Advisory Board of the "I. R. F. A." for the year 1932-33. Obtainable (Price Re. 1) from Secretary, G. B., I. R. F. A. New Delhi (November—March), Simla (April—October).

Reports were received from 73% of Indian cases treated at the institute and from 69% of those at Cuttack. Reports received from European cases were 48% at the institute and 100% at the centre. Semple's 1% carbolic vaccine was used throughout the treatment which lasted 14 days but in 267 institute cases, most of whom had multiple severe injuries, treatment for 21 days was given; among these 6 deaths occurred. 22,274 c. cs. of antirabic vaccine was issued to the Cuttack centre. Of 45 brains examined for rabies, 26 were positive.

### Medico-legal Work.

119. Table VIII (v) summarises the medico-legal work done in those provinces which employ a chemical examiner.

TABLE VIII (v).

	investigated.	detected.	Samples examined.
<b>British India</b>	<b>9,963</b>	<b>6,302</b>	<b>30,890</b>
N.-W. F. P.	373	278	1,080
Punjab	2,052	1,602	7,346
U. P. & C. P.	1,562	982	3,818
	2,249	1,226	5,425
Bombay	929	647	4,376
Madras	1,239	924	5,938
Burma	1,559	643	2,907

*N.-W. F. P.*—378 cases comprising 1,088 articles were investigated. 39 of the 59 human poisoning cases were fatal. Stain specimens numbered 245. Poison was detected in 60% of human cases, cattle poisoning 81%, murders, etc. by violence 82%, and sexual crimes 78%. Arsenic was the commonest poison detected. Five articles in connection with explosives, 1 sample of beer, 1 of opium and 1 of alumina were analysed.

*Punjab.*—A total of 3,346 cases comprising 10,296 articles were examined. Out of 817 human and 59 cattle poisoning cases investigated, 454 and 51 were fatal. 1,162 stain specimens were examined, 67 of these being for the examination of blood and human hair. Poison was detected in 70% of the human cases. The poisons most commonly used were opium 42%, arsenic 24%, *dhatura* 12%, alcohol 5% and mercury 4%. Among others, 29 samples of water, 16 of *ghee*, 168 of spirituous preparations and 28 of chloroform were received for examination.

*U. P. & C. P.*—427 suspected cases of human poisoning were investigated, the total number of medico-legal cases received being 1,562. This number included 89 from the C. P., 11 from Ajmer-Merwara and 31 from Indian States. 1,061 blood and stain cases were examined and 402 specimens for the presence of cocaine. Arsenic, *dhatura* and opium were the commonest poisons detected.

*Bengal.*—Of the 2,249 medico-legal cases investigated, positive results were obtained in 1,226. Medico-legal articles examined numbered 5,940, including 515 samples of preservatives; 737 specimens of human viscera; and 47 from abortion cases. Poison was detected in 195 cases, of which 153 or 51% were opium; 11% arsenic; 10% oleander; 6% aconite; 7% alcohol; and 3%

and 34 over 15 days after completion of treatment, giving a total mortality rate of 0.6%. Reports were received from only 77% of cases treated; efforts were being made to obtain more complete information.

Twenty deaths occurred among those bitten on the face and 40 among those with bites on the trunk and extremities including 36 on the bare skin. In 100 cases, with 1 death, the biting animal was proved to be rabid; in 1,311, with 6 deaths, it was certified rabid; in 3,004, with 53 deaths, it was probably rabid; in 1,795, with no deaths, the history of the animal was unknown. No patient developed paralysis after treatment either at the institute or at the out-centres. 113 antirabic treatments were issued to veterinary surgeons for the treatment of dogs and other animals and 4 medical officers were trained in anti-rabic work.

### Pasteur Institute, Patna.

118. A total of 2,988 cases (2,959 Indians and 29 Europeans) were treated of which 829 were given no treatment, 278 abandoned the course and 17 were untreated. All 24 deaths from hydrophobia, giving a death rate of 0.8%, occurred among Indians having severe bites on the bare skin or on the face. 22 deaths were class III cases and 2 class IV. Eleven deaths were recorded among patients with bites on the leg, 7 on the arm, 4 with multiple bites and 2 with multiple bites on the face. Jackal bites were responsible for 63% of the deaths and dog bites for 29%.

The age at death of 8 patients was under 14 years, of 9 between 15 and 40 years, of 4 between 40 and 60 years and of 3 between 60 and 70 years. In all the 24 fatal cases, hydrophobia developed more than 14 days after the commencement of the treatment but in 1 male, who had been bitten by a dog, the disease developed after 220 days. In a male child who had been bitten by a jackal, hydrophobia developed after 100 days; in other cases the interval varied from 18 to 91 days.

In 16 cases the biting animal was proved to be rabid; in 62, with 2 deaths, it was certified rabid; in 2,190, with 22 deaths, probably rabid; in 712 the history of the animal was unknown; and in 8 the animal was probably not rabid.

A dog was the biting animal in 1,829 cases, with 8 deaths; a jackal in 1,088, with 15 deaths; a monkey in 18; a human being in 12; a horse in 11; a cat in 7; a mongoose, a wolf (1 death) and a goat in 5 each; a donkey in 2; an ass, a calf, a buffalo, a rat and a rabbit in 1 each; and in 1 case the biting animal was unknown.

Of 301 cases, treated at the Cuttack antirabic centre, 295 were Indians and 6 Europeans; 274 of the former and 1 of the latter were at grave risk. 56 abandoned the treatment and 9 were given no treatment. Only 1 Indian, a class IV case, died from hydrophobia. 18 patients had bites on the face; 265, with 1 death, on the trunk and extremities, including 212 with 1 death on the bare skin and 53 through clothing; 18 had licks only. A dog was the biting animal in 194 cases, with 1 death; a jackal in 82; a human being in 9; a monkey in 7; a horse in 3; a goat and a bear in 2 each; and a wild cat and a wolf in 1 each.

### Pasteur Institute, Calcutta.

116. This institute is a part of the School of Tropical Medicine, Calcutta. A total of 7,250 patients including 6,987 Indians and 263 Europeans underwent a full course of treatment. 1,417 were given advice; 8 discontinued treatment as the biting animal failed to show signs of rabies; and 1,044 abandoned the treatment voluntarily. Deaths from hydrophobia numbered 48, 28 of which were classed as 'failures.' The death rate was 0.7% and the failure rate 0.4%. No deaths were reported among Europeans. Of the 6,987 Indian cases, 4,735 had severe bites on the naked skin and amongst these 45 deaths (0.9%) occurred; 1,520 had superficial bites on the bare skin, with 3 deaths; the remaining 732 cases which were bitten through clothing reported no mortality. Of the 48 patients who died, 14 came to the institute for treatment 8 to 14 days after the bite, 12 came 4 to 7 days late; the remaining 22 at varying intervals. Of the 48 fatal cases, 8 developed hydrophobia during treatment, 9 within 15 days and the remaining 28 after 15 days of completion of treatment.

A dog was the biting animal in 5,989 cases or 81%, a jackal in 1,117 or 18%, a cat in 47, a monkey in 43, a horse in 16, a man in 13, a cow and a goat in 5 each, a tiger in 4, a mongoose and a wild cat in 3 each, a squirrel and a pig in 1 each and in 1 case the biting animal was unknown. The hydrophobia rate resulting from jackal bites was 1.6% and that from dog bites 0.5%. Of the 70 specimens examined for rabies, including 62 dogs and 8 jackals, 34 were positive.

Sample's carbolised 1% vaccine was used, this being made from sheep's brain with the Paris strain of fixed virus. The treatment for licks was 5 c.cs. daily for 7 days, and for bites 5 c.cs. daily for 14 days.

### Pasteur Institute, Bombay.

117. This institute is a part of the Haffkine Institute, Bombay, and is directed by Dr. H. Maurice, I.S.O., I.M.D.

*Parent Institute.*—A total of 1,952 persons applied for treatment; of these 1,247 underwent complete treatment, 196 discontinued treatment before the course was complete and 509 were cases requiring no treatment. Of the total treated, 40 were Europeans. Most of the patients had bites on the bare trunk or extremities. Reports were received from 98 % of the cases treated; 1 death occurred within, and 2 deaths over, 15 days after completion of treatment, giving a total mortality rate of 0.24%. In 106 cases, the biting animal was proved to be rabid; in 22 it was certified to be rabid; in 200 it was probably rabid and, in 919 the history of the animal was unknown. One death took place among patients bitten by animals proved to be rabid and 2 deaths among those bitten by animals of unknown history.

A dog was the biting animal in 1,197 cases, with 3 deaths; a cat in 32, a monkey in 7, a fox in 2, a jackal in 1, a mongoose in 1, a man in 6, and in 1 case the biting animal was unknown. Of the 201 brains examined, including 184 dogs, 159 and 152 respectively were positive.

*Out-centres.*—A total of 6,236 cases, including 250 Europeans, received a full course of treatment at 53 out-centres; 43 were advice cases. Four patients were said to have died of hydrophobia during treatment; 26 within 15 days

biting animal was not rabid; and 247 were given advice. Among the 1,277 treated cases there were 6 deaths, 5 males and 1 female, giving a rate of 0.5%. All of these cases were Asiatics and had severe multiple dog bites on the face or bare trunk and extremities. 1,128 cases with 6 deaths sought treatment within a week after the bite; 90 within 1-2 weeks; 25 within 2-3 weeks; 13 within 3-4 weeks; and 21 at longer intervals. 49 cases were under 4 years of age; 104 between 5 and 9 years; 98, with 1 death, between 10 and 14 years; 106 between 15 and 19 years; 370, with 1 death, between 20 and 29 years; 284, with 2 deaths, between 30 and 39 years; 161, with 2 deaths, between 40 and 49 years; 69 between 50 and 59 years; 24 between 60 and 69 years; and 12 of 70 years and over. In 180 cases, with 1 death, the biting animal was proved rabid; in 41 the animal was certified to be rabid; in 370, with 3 deaths, the animal was probably rabid; in 661, with 2 deaths, the history of the animal was unknown; and in 25 the animal was probably not rabid. A dog was the biting animal in 1,258 cases with 6 deaths; a cat in 11, a human being in 6 and a jackal and a horse in 1 each. 724 cases were treated in the first half of the year, February recording the largest number and 553 in the second half, September recording the lowest figure.

The method of anti-rabic treatment with vaccines of graduated strength adapted to the degree of risk was continued. In addition, a simplified form of treatment, consisting of injections of 1% vaccine extending over 14 days for mild and 21 days for severe cases was issued to civil surgeons outside Rangoon who treated 96 cases. Most of these attended the civil hospitals at Akyab, Mandalay, Maymyo and Moulmein. The 2 centres of the Burma Oil Company at Chauk and Nyaungghla treated 39 cases with no deaths. Only sheep vaccine was used throughout the year. One case of "paralytic accident" involving eye sight was reported\*.

The brains of 137 animals, including 128 dogs, were examined for rabies; 65, including 61 dogs, gave positive results.

*Bacteriological Section.*—A total of 18,663 bacteriological examinations were carried out. These included Wassermann tests 13,413; Kahn's tests 854; Widal tests 993; 1,953 microscopical, 568 cultural and 516 chemical and biochemical examinations.

Issues of vaccines and sera included T. A. B. vaccine 22,633 c.cs.; auto-genous vaccine 1,144 doses; stock curative vaccine 88 doses; anti-anthrax serum 40 c.cs.; anti-dysenteric serum 795,000 units; anti-streptococcus serum 1,165 c.cs.; anti-streptococcus serum (concentrated) 1,302 c.cs.; anti-venin 5,600 c.cs.; anti-diphtheritic serum, 420,000 units; and anti-tetanus 5,071,000 units.

109,825 c.cs. of hydnocarpus oil with 4% creosote; 63 lbs. of pure hydnocarpus oil; 40,640 c.cs. of 3% alepol; 200 c.cs. of E. C. C. O.; and 100 c.cs. of sodium morrhuate solution were also issued.

*Research section.*—Owing to the abolition of the post of the Assistant Director, only a minimum of research work could be done but an investigation into the value of serological methods for the diagnosis of enteric fevers in Burma was carried out. The results will be published shortly.

---

\* For details see Anderson and Cormack's paper, 'Double Papilloedema following antirabic inoculation. Recovery.' I. M. G. Vol. LXVIII, No. 8, page 459.



continued. Although in the province as a whole the incidence of cholera was low, Nowgong district was threatened with serious outbreaks on 3 sides, but only 27 deaths were reported during the year as against 124 during the triennium 1929-31. Habiganj, a parallel experimental area, also did not experience the usual autumnal outbreak. Exact data were obtained for 2 epidemics of cholera in which every house was visited. It was found that when bacteriophage was given to the first case in a house, the number of secondary cases was definitely less than when the first case was not so treated; and where bacteriophage was given to the first case in a house, the infectivity of that case was about one-third to one-fourth of the infectivity of an untreated case. The particulars elicited in this house-to-house enquiry have been tabulated in Table VIII (*iv*).

TABLE VIII (*iv*).

	Not treated.			Treated within 48 hours.		
	Recoveries.	Deaths.	Death rate per cent.	Recoveries.	Deaths.	Death rate per cent.
Sibsagar epidemic	207	192	48.1	95	29	23.4
Darrang „	23	115	83.3	37	30	44.5

*The Assam Medical Research Society.*—This society is financed partly by Government, partly by the I. R. F. A. and partly by the Indian Tea Association and the Assam Oil Company. Its malaria officer initiated and supervised surveys and other anti-malaria schemes. A detailed study of the anophelines carried out in 9 districts showed that *A. minimus* was still the chief species in this province. The percentage of infected mosquitoes varied between 14% in Shillong, 6.8% in Darrang and 2.8% in Lakhimpur. The conspicuous absence of *A. minimus* in the Naga Hills and its presence in large numbers in Shillong, situated at the same altitude of 5,000 ft. was a noteworthy observation. Another interesting point was the discovery of infected *A. maculatus* in Shillong. Parasite surveys were carried out in many places. Plasmoquine treatment was tried in Kohima, Nongpoh, Doom-Dooma and Namsang with indecisive results. The results obtained in an isolated community with minimum doses of plasmoquine simplex given to all children appeared to be significant, but mass treatment with quinoplasmoquine in a town, where there was a high infectivity rate and where no anti-larval measures were undertaken, did not produce any striking results although a more extended trial was considered necessary.

Other investigations included the incidence of anaemia of pregnancy among female workers on tea estates and black water fever in Margherita, a coal mining area. For further details of the Society's activities, the original report should be consulted.

#### Burma Pasteur Institute and Bacteriological Laboratory.

115. Lt.-Col. L. A. P. Anderson, I.M.S., was Director throughout the year. The post of Assistant Director was abolished as a measure of economy.

*Anti-rabic treatment.*—A total of 2,545 persons attended, of which 1,277 underwent the full course; 416 absconded; 605 discontinued treatment as the

*Anti-rabic treatment.*—A total of 1,269 patients (50 Europeans and 1,219 Indians) underwent the full course of treatment; only 45 of these were treated at Shillong and 1,224 at 39 of the 46 out-centres. Deaths numbered 11, all amongst Indians who arrived at the centres for treatment within a week of being bitten. This total gives a death rate of 0.9% and a failure rate of 0.6%. No death was reported amongst the cases treated in Shillong; no treatment was given to 150 cases and 51 received only partial treatment. Five deaths occurred among children under 10 years of age, 5 amongst persons aged 20-40 years and 1 among those between 50-60 years. Most of the European patients were only lick cases; 837 patients or 66% of the total treated, were severe bites and all the deaths occurred in this group. In the case of 30 patients the biting animal was proved to be rabid; in 31 it was certified to be rabid; in 983 (with 9 deaths) it was probably rabid; in 203 (with 2 deaths) the history of the animal was unknown; and in 22 cases the animal was not rabid according to the statements made by the patients. A dog was the biting animal in 1,045 cases with 7 deaths, a jackal in 183 with 4 deaths, a cat in 14 cases, a cow in 10, a human being in 8, a horse in 6, and a sheep, a pig and a goat in 1 each. 2% carbolised vaccine was used. Of 40 specimens examined for rabies, 26 were positive.

*Vaccines.*—169,316 doses of cholera, 4,419 c.c.s. of T. A. B. and 6,220 c.c.s. of influenza vaccine and 220,695 doses of bacteriophage were issued. The demand for dysentery bacteriophage in the tea-gardens is said to be steadily increasing.

*Research work—Bacteriophage.*—The Director reported:

"The method of preparation described in last year's report continued to work satisfactorily as judged by the analysis of each brew. The analysis is carried out by the use of strains of cholera and dysentery made resistant against 9 types (A, B, C, D, E, F, G, H and J) of cholera bacteriophage taken 8 at a time and against 7 types\* (N, O, P, Q, R, S and T) of dysentery phage taken 6 at a time. Agglutination and absorption tests were carried out with immune sera prepared against 10 parent bacillary strains and the secondary bacteriophage resistant cultures obtained by the action of 'Q' and 'R' types of bacteriophages on these strains. It was found that the parent (P) sera agglutinated in all cases their homologous strains, and, with the exception of 2 strains, also their 'Q' and 'R' corresponding variants. When such parent immune sera were absorbed by their homologous strains, not only were the agglutinins removed for the homologous strains but also for those of the 'Q' and 'R' resistant types. The 'Q' resistant cultures only removed their own agglutinins from such sera, leaving the agglutinins for the parent and 'R' strains practically untreated. Immune sera prepared for the 'R' resistant cultures behaved in 7 cases out of 10 like the parent immune sera both in the agglutination and absorption tests. The 'Q' immune sera always agglutinated the homologous 'Q' resistant strains to a high titre. Their action, however, on the parent strains and more particularly on the 'R' resistant strains was decidedly less than their action on the homologous strains. When these sera were absorbed by any of the 3 types of cultures (i.e. parent and the 'Q' and 'R' resistant), the agglutinins for all of these were removed. It appears from these results that the anti-genic structure of both the parent and the phage 'R' resistant cultures is more or less similar but it is changed considerably in the case of bacteriophage 'Q' resistant types. The fact that the 'Q' immune sera have agglutinins for both the 'P' and 'R' strains shows that the 'Q' cultures still possess a small portion of the agglutinin which is mainly present in the 'P' and 'R' strains. It has already been noted that 'Q' bacteriophage converts a rough bacillary strain into a smooth one. In these cases such strains behave as specific species. The agglutination and absorption tests with 'Q' strains confirm this. An investigation is being made to determine whether the change produced in the anti-genic structure after action by these bacteriophages corresponds to the change in their virulence."

\* To avoid confusion their previous titles (G to N) have been altered to N to T.

The field experiments with cholera bacteriophage in Nowgong (Assam Valley) and Habiganj (Sylhet district) which commenced in 1929 were

at the military centres. No marked reaction was noted in any of the cases treated with 5% vaccine and no complications were reported to have followed the treatment. The Paris virus obtained from Kasauli was in its 891st passage on 31st December. Anti-rabic vaccine was supplied to 107 centres and total issues amounted to 144,900 doses. Ten Government and 7 Railway and other medical officers were trained in the special technique.

A dog was the biting animal in 517 cases with 4 deaths, a cat in 29, a monkey in 7, a man and a rat in 3 each, a donkey in 2, a fox, a wild cat and a cow in 1 each and in 2 cases the biting animal was not known. Of the 340 brains examined for rabies, 238 were positive, 24 negative and 50 were inconclusive. The remainder were unfit for examination.

*Local centres.*—The 1% vaccine was used up to 30th September and 2% and 5% vaccines during the rest of the year. Military cases were treated with 2% vaccine from 21st March and with 5% vaccine from 10th May. Vaccine sufficient to treat 10,350 cases was issued to these centres, although only 8,452,—6,327 of classes III and IV and 2,125 of classes I and II, were said to have completed treatment, the health of the patients being ascertained in 8,082 cases. Of the 8,452 cases, 34 died,—1 European and 33 Asiatics; 32 of classes III and IV and 2 of class II. 7 deaths occurred during treatment; 3 among the incompletely treated; 9 within 15 days after completion of treatment; and 15 over 15 days after completion of treatment. The death rate was 0.3% and the failure rate 0.2%. In the case of 267 cases with 1 death the biting animal was proved to be rabid; in 227 it was certified to be rabid; in 6,855 with 33 deaths it was probably rabid; 105 were probably not rabid; whilst in 998 cases no particulars were available.

The biting animal was a dog in 8,030 cases, and among these all the 34 recorded deaths occurred; a jackal in 124; a fox in 71; a cat in 56; a man in 48; a rat in 31; a cow in 27; a monkey in 17; a horse in 14; a donkey in 10; a goat in 9; an elephant in 4; a panther and a sheep in 2 each; and a pig and a bear in 1 each; whilst in the case of 3 the animal was not known and in 2 the infection was acquired in the laboratory. 565 cases with 2 deaths were under 4 years of age; 1,503 with 8 deaths were aged 5-9 years; 1,468 with 6 deaths between 10-14 years, 638 with 3 deaths between 15-19 years; 1,450 with 3 deaths between 20-29 years; 1,201 with 6 deaths between 30-39 years; 857 with 5 deaths between 40-49 years; 468 with 1 death between 50-59 years; 210 between 60-69 years; and 42 were 70 years and over: 5,021 cases with 12 deaths were bitten on the legs; 2,534 with 17 deaths on the arm; 363 with 1 death multiple bites; 244 with 4 deaths on the face; and 290 on the trunk. Among the 34 deaths, 19 cases had sought treatment 1-7 days after the bite; 7 cases 8-14 days; 5 cases 15-21 days; 1 case 29-35 days; and 2 cases 50 days and over.

*Research work.*—Five scientific papers, published in the I. J. M. R., are included in the appendix to this section (page 386).

#### **King Edward VII Memorial Pasteur Institute, Shillong.**

114. Lt.-Col. J. Morison, C.I.E., I.M.S., was Director throughout the year. This institute functions as the provincial laboratory as well as a Pasteur Institute.

*After-effects.*—Complaints attributed to treatment were received from 89 patients but as usual there was no evidence that the complaints had any causal relationship to treatment. No definite case of paralysis following treatment was recorded.

The brains of 434 animals were examined and 251 were found positive for rabies.

*Research work.*—The investigation into the relative immunising values of the Paris and Kasauli strains of rabies fixed virus was brought to a conclusion during the year and the main points which have emerged and on which standard treatment is now based are : (a) the advantage of large over small doses of vaccine and (b) the superior anti-genic value of the Paris virus as compared with the Kasauli virus.

Other work included animal experiments to test the value of chemical agents in preventing the onset of rabies and experiments to test (a) the value of serum as an adjunct to vaccine treatment in post-infectious immunisation ; (b) the pre-infectious immunising value of various vaccines ; (c) the duration of immunity in immunized animals ; and (d) to prepare a safe and efficient vaccine for dogs in which immunisation was limited to two doses of vaccine. An investigation of the morphological aspects of the brain and salivary glands in rabies was also made, whilst the Trypanosomidae enquiry concentrated on various animal blood parasites.

Nine scientific papers were published by members of the staff.

#### **Pasteur Institute of Southern India, Coonoor.**

113. Major K. R. K. Iyengar, I.M.S., was Director throughout the year.

*Institute.*—566 patients (42 Europeans and 524 Asiatics) underwent complete treatment ; 191 persons were given advice without treatment. Four deaths occurred, all having deep wounds on the bare skin ; in 1 male case hydrophobia developed 109 days after treatment was commenced, in 2 others 23 and 36 days elapsed, whilst in 1 case the period was not reported. All were Asiatics, 3 being males and 1 female ; 2 were between 10 and 14 years of age, 1 between 20 and 29 and 1 between 50 and 59 years. In 2 of the cases, treatment was sought within 3 days after the bite, in 1 within 8 to 14 days and in one 29 to 35 days.

The shortest and longest incubation periods recorded were 16 and 179 days respectively. In 432 of the 566 cases, the biting animal was probably rabid and all 4 deaths occurred in this group ; in 38 the animal was proved rabid ; in 4 it was certified rabid ; in 69 the history of the animal was unknown ; and in 23 the animal was probably not rabid.

Semple's carbolised sheep vaccine was used throughout. Up to 25th April, the dosage was 5 c.c. of 1% vaccine for classes I and II and 5 c.c.s. of 5% vaccine for classes III and IV ; during the rest of the year, classes I and II cases received 5 c.c.s. of 2% vaccine daily for 7 and 14 days respectively and classes III and IV cases 5 c.c.s. of 5% vaccine daily for 14 days. Military cases of classes I and II were treated up to 21st March with 5 c.c.s. of 1% carbolised sheep vaccine and with 2% vaccine during the rest of the year ; classes III and IV with 5% vaccine up to 9th May from which date treatment was given

Table VIII (iii) gives figures arranged according to lateness of arrival expressed in days for Asiatics treated at the Institute and its centres :—

TABLE VIII (iii)

Arrival in	Kasauli.			Centres.		
	Treated.	Deaths.	Death rate per cent.	Treated.	Deaths.	Death rate per cent.
1—7 days . . . . .	5,351	35	0.6	3,812	19	0.5
8—14 „ . . . . .	1,009	10	1.0	632	2	0.3
15—21 „ . . . . .	205	4	1.9	202	..	..
22—28 „ . . . . .	40	1	2.5	69	..	..
over 28 „ . . . . .	175	1	0.6	172	1	0.6

The biting animal was a dog in 10,990 cases with 53 deaths; a jackel in 1,144 with 18 deaths; a human being in 226; a cow and a bullock in 102; an otter in 62; a buffalo in 59; a horse in 52; a cat in 36; a donkey in 32; a monkey in 29; a mule in 15; a mongoose in 13; a wolf in 10 with 1 death; a hyena in 8; a goat in 6; a fox in 3; a leopard, a pig and a camel in 2 each; a panther and a badger in 1 each; and in 1 fatal case the animal was unknown.

During 1932, 8 civil and 1 military centres were opened at Allahabad, Agra, Benares, Lucknow, Mussoorie, Nainital, Ajmer, Gwalior and Nasirabad. 20 civil and 19 military centres obtained their supplies of vaccine from Kasauli.

Of 4,273,516 c.cs of vaccine manufactured, 2,990,457 c.cs were used at the Institute and 1,283,059 c.cs. at the centres and other places.

The scheme of treatment employed for the various classes of patients was as follows. From 1st January, carbolised vaccine prepared from the Paris strain of rabies fixed virus was used for treating all cases at Kasauli and its centres. At the Institute, cases of Class IV and Class III were treated with carbolised Paris sheep 5% vaccine during the whole year. From 9th October, after it had been decided to decentralise these cases, their treatment was also carried out at the centres. Patients were divided into adults and children, a child weighing 71 lbs. and over being treated as an adult.

The scheme of dosage and the duration of treatment were as follows :—

Class IV—Adults.—Face : 12 c.c. daily for 14 days. Extremity : 8 c.c. daily for 14 days.

Class IV—Children.—Face : 8 c.c. daily for 14 days. Extremity : 6 c.c. daily for 14 days.

Class III.—Adults : 6 c.c. daily for 14 days. Children : 4 c.c. daily for 14 days.

Classes I and II cases were treated with a carbolised Paris sheep 2% vaccine, Class I cases receiving 5 c.c. for 7 days, and Class II cases 5 c.c. for 14 days.

*Class I.*—Cases not bitten but licked on fresh cuts or abrasions.

*Class II.*—Superficial but not extensive bites on the trunk and extremities, excluding the fingers.

*Class III.*—Superficial bites on the fingers. Superficial extensive bites, on all parts of the body, except the head and neck, and deep but not extensive on all parts of the body except the head and neck.

*Class IV.*—Deep and extensive bites on all parts of the body and all bites and scratches on the head and neck.

treatment was unnecessary. 51 deaths occurred amongst the Asiatics treated at Kasauli, 22 deaths amongst the Asiatics treated at the centres and no death amongst Europeans. The death rate at Kasauli was 0.74% and that at the centres 0.37%. The total death rate for all cases was 0.57%.

Of the 6,868 cases treated at Kasauli the biting animal was proved to be rabid in 249 cases: was certified to be rabid in 36 and was probably rabid in 5,544 (46 deaths). The history of the animal was unknown in 968 cases (5 deaths) and the animal was probably not rabid in 71 cases. The figures for the centres under these categories were—proved rabid 512 cases (3 deaths); certified rabid 671 cases; animal probably rabid 3,543 cases (16 deaths); history of animal unknown 1,070 cases (3 deaths); animal probably not rabid 137 cases.

The death rates amongst Asiatics treated at Kasauli and its centres according to position of wounds are given in Table VIII (ii).

TABLE VIII (ii).

Position of wounds.	Kasauli.			Centres.		
	Treated.	Deaths.	Death rate per cent.	Treated.	Deaths.	Death rate per cent.
Leg . . . . .	3,803	8	0.2	2,941	9	0.3
Trunk . . . . .	146	1	0.7	123	..	..
Arm . . . . .	1,569	12	0.8	1,410	4	0.3
Multiple . . . . .	729	10	1.4	260	3	1.1
Face . . . . .	307	13	4.2	117	..	..
Multiple Face . . . . .	226	7	3.1	36	6	16.7

Of 6,780 Asiatics treated, 4,306 had deep bites with 49 deaths and 2,474 had superficial bites with 2 deaths. 5,478 cases (49 deaths) were bitten on the bare skin and 1,302 cases (2 deaths) through clothing. The figures for the centres were 612 deep bites with 13 deaths and 4,275 superficial bites with 9 deaths; 4,305 cases (22 deaths) were bitten on the bare skin and 582 cases through clothing.

Details of the work of the various Pasteur Institutes mentioned will be found in the following publications:—

- (1) Pasteur Institute of India, Kasauli—32nd Annual Report of the Central Committee of the Association and the Report of the Director of the Institute for 1932.
- (2) Pasteur Institute of Southern India, Coonoor—The Annual Report of the Director for 1932 together with the 26th Annual Report of the Central Committee of the Association for 1932-33. Methodist Publishing House, Madras.
- (3) King Edward VII Memorial Pasteur Institute and Medical Research Institute, Shillong. The 16th Annual Report for 1932. Assam Government Press, Shillong (Rs. 1.2 per copy).
- (4) Report on the working of the Burma Pasteur Institute and Bacteriological Laboratory for 1932 and for 1932-1933 respectively. Superintendent, Government Printing and Stationery, Burma. (Re. 1 or 1s. 6d.).
- (5) Pasteur Institute, Calcutta, 9th Annual Report of the Pasteur Institute, Calcutta, for 1932. Bengal Secretariat Book Depot, Calcutta.

of one vesicle per 10 linear inches. In general, the results were irregular for intermediate dilutions. The experiments were being repeated.

(c) *Treatment of smallpox with anti-vaccine serum.*—Buffalo calves, which had been used for the seed passage of vaccine lymph and which were thus immune, were hyperimmunised at weekly intervals by 3 intravenous injections of vaccine lymph in saline. Two weeks after the last injection they were bled. Animal experiments showed that this serum protected against vaccinia, but not if given 24 hours or later after infection. Treatment of 15 cases of smallpox at Tondiarpet infectious diseases hospital with small doses of 20 to 40 c.cs. of this serum showed, however, no particular benefit. As these cases were very severe, the early administration of large doses was indicated. Serum from convalescent cases of smallpox was collected and tried on 5 cases with apparent benefit in only 1 case.

(d) *The action of CO<sub>2</sub> and CO on fleas.*—It was concluded that neither CO nor CO<sub>2</sub> could be of much value in practice, as high concentrations were not attainable in rat burrows, whilst fleas survived short exposures to pure CO<sub>2</sub> and to 7% CO respectively.

(e) *Rat-flea survey of Mysore and seasonal prevalence of rat-fleas.*—The survey of 6 different places in Mysore showed that *X. cheopis*, *X. braziliensis* and *X. astia* were the common rat-fleas. A paper embodying the results of surveys in Saidapet, Bellary and Coimbatore on the seasonal prevalence of rat-fleas was submitted for publication.

(f) *Leptospirosis in rodents in Madras.*—A number of rodents was examined to ascertain whether leptospirosis in rodents existed in South India. The method of dark-ground examination of wet preparations of emulsions of the kidney cortex was used. Only 7 of the 100 *Bandicota indica* species examined showed leptospira; none in *Rattus rattus* or *Funambulus palmarum*.

(g) *Comparison of Kahn's standard antigen with the Institute antigen for the Kahn test.*—A reasonably close agreement between the two antigens was found.

(h) *Researches on Cholera bacteriophage.*—A paper entitled "The influence of hydrogen ion concentration on Cholera bacteriophage—A preliminary note" was submitted for publication. Various other minor investigations were also conducted.

### Pasteur Institute of India, Kasauli.

112. Lt.-Col. H. E. Shortt was Director from 1st January to 8th March and from 24th October to 31st December. In the intervening period Major S. D. S. Greval, I.M.S., officiated.

Of 15,118 patients who sought treatment at Kasauli and its centres, 12,801 underwent the complete course. Out of 6,868 treated at Kasauli, 5,643 males and 1,137 females were Asiatics and 59 males and 29 females were Europeans. At the centres a total of 5,933 cases were treated. Of these 4,136 were male and 751 female Asiatics and 706 were male and 340 female Europeans. 1,168 cases left before completing treatment and 1,045 were advised that

presented a much smaller proportion of reactors than children in many Western countries.

**\*King Institute of Preventive Medicine, Madras.**

111. Lt.-Col. H. H. King, I.M.S., was Director of the Institute from 20th October, 1931, except for a short period when Rao Bahadur T. Sitapati Ayyar and Major W. J. Webster, officiated. Dr. C. G. Pandit, Rao Bahadur T. H. Sitapati Ayyar and Major Webster acted successively as Assistant Director.

*Vaccine lymph.*—Only glycerinated lymph is issued; details of its manufacture will be found in Section VI of this report.

*Bacterial vaccines.*—Issues included 386,795 stock doses of cholera, 18,060 of T. A. B. and 1,235 of influenza vaccines. Other vaccines and sera were also stocked and issued; these included 15,026 doses of gonococcus vaccine, 6,007 of staphylococcus pyogenes, 4,762 of streptococcus, 1,848 of mixed staphylococcus and streptococcus vaccine. The manufacture of cholera bacteriophage on a large scale was commenced during the year and 81,540 c.cs. out of a total of 98,000 c.cs. manufactured were issued to the Public Health Department.

*Bacteriological, chemical and serological examinations.*—A total of 47,487 examinations was carried out; including microscopical and bacteriological 6,460, serological 34,458, chemical 296, water samples 6,186 and others 87. Of the 34,458 serological tests, 13,653 were positive. 1,306 samples of protected water supplies were also examined.

*Investigation units.*—These were engaged chiefly on routine duties.

Some of the research work carried out is summarised below but for details the original report and the 7 papers published in the I. J. M. R., the I. M. G. and the Journal of Hygiene should be consulted.

(a) Some years ago, the method practised by the Government Lymph Establishment at Hendon in England of adding up to 0.1% of clove oil to the vaccine lymph soon after manufacture was tried at this institute and was found to reduce the potency of the lymph. As a considerably increased activity of the lymph had been previously obtained, the experiment was repeated. It was reported that "the bactericidal action of clove oil up to 0.1% is very good, indeed, particularly at air temperatures its action is very rapid, and at such temperatures though the virus tends to be damaged, it is still active after three weeks. At temperatures below freezing point, the deterioration of the potency is negligible even after three months and the bacterial purification is very good."

(b) *Determination of the dilution end point of vaccine lymph.*—Three samples of lymph in progressive dilutions of 1/5000 upwards were tested for virus activity on calves. One sample diluted to 1/3,000,000 showed an average

---

\* Report of the King Institute of Preventive Medicine, Guindy, for the year ending 30th September, 1932. Government Press, Madras.



plague prophylactic contained most of the protective power, the sediment having only 1/100th to 1/300th of the immunising power of the whole vaccine.

(b) *Anti-plague Serum*.—Dr. Wagle continued work on the preparation of anti-plague serum, using a variety of animals with the object of determining the most suitable type.

(c) *Epidemiology of Plague*.—Dr. Chitre continued his investigation into the immunity of rats to plague in areas in which the disease had occurred in epidemic form. The main feature of the work was the employment of an accurately measured infective dose. The results obtained so far show that this immunity is roughly proportional to the severity of the epidemic.

(d) *Chemotherapy of Plague*.—Work with the halogenomercuriphenols was continued by Lt.-Col. Taylor and Dr. Wadia. It was previously shown that the germicidal action of these compounds *in vitro* was of the same order and degree as that of mercuric chloride but further study showed that when injected either subcutaneously or intravenously into rabbits the organic compounds were from 3 to 7 times less toxic than the chlorides, but still too highly toxic to be of any value. An extended trial was given to difluoro compound as it was found to be the least toxic but even in this case the results were variable and no definite indications of life saving value were noted. It was therefore decided to give up further trials with these drugs. An effort was made to test the value of two proprietary drugs which, from the descriptions of the makers, seemed to be ideal for the purpose—Merthiolate and Salyrgan. The animal tests carried out did not show that these drugs possessed any definite curative power against plague. It was decided not to proceed further with this enquiry.

(e) *Indigenous Drugs*.—The following drugs were studied: (1) the bark of *Symplocos racemosa* Roxb. and *Alstonia scholaris*, R. Br.; (2) the leaves of *Hydrocotyle asiatica* Linn. and *Melia azadirachta*, Linn.; (3) the roots of *Saraca indica*, Linn.; and (4) the roots and fruit of *Tribulus terrestris*, Linn.

(f) *Tuberculosis Enquiry*.—An investigation on the filterability of the tubercle bacillus was continued and evidence was obtained of the existence of a filter-passing stage of the tubercle bacillus. This evidence is based not merely on the finding in the inoculated animals of acid-fast bacilli but on the successful cultivation of these bacilli on suitable media and the production by them in appropriate animals of definite lesions of tuberculosis. A change in the biological characters of the bacilli in 3 out of 5 positive experiments was also observed. This change may partly explain the negative results obtained by other workers. Control experiments showed that the positive results were not due to spontaneous or accidental infection of the experimental animals.

Experiments carried out on some of the common laboratory animals,—rabbits and guinea-pigs,—yielded largely negative results, indicating that spontaneous tuberculosis in these animals under laboratory conditions in Bombay is a matter of rare occurrence.

A survey of the incidence of tuberculous infection among different groups of population in the Madras Presidency was carried out during the early part of the year and over 26,000 tuberculin tests were done on individuals in jails, mills, hospitals, schools, etc. It was found that school children in India

lesions showing none or few bacilli. The results obtained have been published in the International Leprosy Journal. Other work included cytological studies; a study of the occurrence of bacillaemia in early cases and contacts; and rat leprosy experiments.

*Diabetes*.—The distribution of sugar in the blood of diabetic and non-diabetic subjects was studied and a preliminary paper was published in the I. M. G.

The work of the Pasteur Institute has been dealt with on page 242 of this report.

For further details of the activities of the School, the Director's annual report should be consulted. 71 scientific papers were published by the School staff and workers (see page 386). In addition, 14 other papers and one book were under preparation.

### **Haffkine Institute, Bombay.**

110. Lt.-Col. J. Taylor, D.S.O., I.M.S., was Director from 1st January to 25th October, 1932, and Lt.-Col. S. S. Sokhey, I.M.S., from 26th October to 31st December, 1932. Lt.-Col. Sokhey, Dr. S. N. Gore and Major S. D. S. Greval, I.M.S., were Assistant Directors and Dr. B. P. B. Naidu and Dr. M. B. Soparkar carried out researches on special subjects. The Institute continued to function as (a) the centre for the manufacture of plague vaccine for the whole of India; (b) the centre for the manufacture of anti-rabic vaccine for Bombay Presidency and the treatment centre for Bombay City; (c) the provincial diagnostic laboratory for the Bombay Presidency; and (d) the centre of medical research.

*Plague Vaccine Section*.—A total of 1,361,978 doses was issued as compared with 882,640 doses in 1931. The largest monthly issue, 233,230 doses, was made in October, and the lowest, 20,874, in June. British India was supplied with 784,649 and the Indian States with 574,178 doses. Bombay Presidency alone took 272,510 doses.

653,862 rats from Bombay City were examined; of these 690, or 0.25% were plague infected, 623 being identified as *Rattus norvegicus* and 67 as *Rattus rattus*. The peak of infection was reached in March and April and the minimum incidence in November and December.

*Anti-rabic Section*.—Details of the work in this section are given on page 242.

*Diagnostic Section*.—Bacteriological, serological, pathological and biochemical examinations were done for various hospitals in the Presidency.

*Research work*.—(a) *Plague Vaccine*.—The investigation into the factors which influence the potency of the vaccine was continued by Major Sokhey and Dr. Maurice. The temperature of incubation was found to influence profoundly the virulence of *B. pestis*, for example, cultures incubated at 37°C. lost their virulence much earlier than those grown at 27°C.; and growth at 27°C. was nearly twice as profuse as at 37°C. *B. pestis* seems to tolerate a fairly wide range of reaction in the medium as it grows well within a pH range of 6.4 to 7.4. It was also determined that the clear fluid of Haffkine's

tion of cyanic acid. It was further proposed to study the toxin of the cholera vibrio on the following lines: (i) to isolate it and study its nature; (ii) if the toxin proves to be a large molecule, to attempt to make an anti-toxin serum; (iii) to separate, if possible, the different antigens from both cholera and cholera-like vibrios and to produce a polyvalent or a vibrio-group serum.

*Leprosy.*—Two special courses of instruction were attended by 59 doctors. The propaganda worker of the B. E. L. R. A. visited Assam, Orissa Feudatory States, the U. P. and Burma. The Bengal Branch of the B. E. L. R. A., which has been directed by this department, has been able to open 100 clinics in Bengal, to train numbers of doctors and to give courses of lectures in the medical schools throughout the province. Surveys of Murshidabad, Pabna and Rajshahi districts and of beggar lepers in Calcutta were carried out.

The intradermal injection method of treatment has largely superseded intramuscular and subcutaneous injections. Hydnocarpus oil is more suitable for intradermal infiltration than for intramuscular injection. The intradermal method was also employed in testing the efficacy of other drugs. Mercurochrome considerably benefited some cases, especially in clearing up the septic conditions which frequently complicate leprosy. The whole question of the significance of negative bacteriological findings as a criterion of progress under treatment and the infectivity of certain types of cases has been raised, but it seems clear that while the finding of Hansen's acid-fast organism is a clear sign of the presence of leprosy, its absence, or failure to find it, is not a definite proof that the infective organism is absent. The only reliable criterion of the arrest of leprosy is the absence both of bacteriological findings and of clinical signs over a considerable period of time.

Of the 1,508 persons who attended the clinic at the Tropical School, 1,329 were diagnosed as definite cases of leprosy. Clinical and bacteriological studies made during the past few years have shown that in certain cases and in certain lesions of leprosy there is a marked lack of relation between the lesions and the numbers of *M. leprae*. Possible explanations of this phenomenon are:—(a) the lesions may be caused by acid-fast bacilli which have later disappeared leaving a granulomatous condition of the skin and nerves; (b) the bacilli may be present in such small numbers as to evade detection; (c) the lesions are not caused by bacilli but by toxins acting on the skin and nerves; (d) the lesions are of a neuro-tropic nature caused by lesions in the nerve; and (e) the lesions are caused by non-acid-fast, possibly filterable, forms of the leprosy organism. A careful study of macular lesions in leprosy has also been made. All showed hypo-pigmentation and most of them some erythema and thickening; analgesia was present in many and superficial anaesthesia in a few. Some of the lesions were associated with thickening of cutaneous nerves supplying the area of skin affected. The pathological changes seen in these lesions were of two types which often differed markedly; the first type showed a diffuse granuloma of the corium consisting largely of the so-called epithelioid cell of leprosy, whilst in the second type the granuloma in the corium was often localised in the sub-papillary layer and round the hair follicles and sweat glands. Attempts were made to test the hypotheses referred to as explanations of the cause of these frequently marked

investigations undertaken were (a) reticulo-endothelial blocking experiments with rabbits to make them susceptible to leishmania infection; (b) comparative "opsonic" experiments with flagellate cultures and washed blood cells from kala-azar patients; (c) histological examination of the skin in cases of kala-azar and dermal leishmaniasis to confirm the observation of Cash and Hu that leishmaniasis is frequently present in the skin in these conditions; (d) intra-dermal injection of dyes, Indian ink and leishmania cultures, followed by skin section of the part thus injected, with the object of tracing the course of the injected leishmania; and (e) the maintenance of the plasmodium infection in the *Macaca mulatta* (rhesus) and *Macaca irus*.

In the kala-azar out-patient department of the School, 228 patients were treated with neo-stibosan; only 11 were treated at the village treatment centre.

*Hookworm.*—A synthetic preparation known as hexylresorcinol proved unsatisfactory in regard to anthelmintic properties in cases of ascaris and hookworm; moreover the drug was found to be highly toxic under certain conditions. Experimental work was carried out on European and Indian cases in order to test whether the apparent absence in Calcutta of a skin condition known as "creeping eruption" usually caused by larvæ of the cat hookworm, (*Ancylostoma braziliense*), was due to racial immunity or other factors. Results have shown that no racial difference exists in the liability to this disease. The collection of helminths from the Calcutta Zoological Gardens was continued.

*Bowel diseases.*—Four years ago Dr. Asheshov described three types of cholera bacteriophage differentiating the types morphologically according to the size and characteristics of the plaques. Four more types have been isolated by Capt. Pasricha and 3 others at Shillong by Lt.-Col. Morison. There are thus 10 known types of bacteriophage active against vibrios agglutinable by cholera serum. In addition, 14 races of bacteriophage active against certain strains of vibrios not agglutinable by cholera high titre serum and not lysable by cholera phage were isolated. A very definite relationship between cholera vibrio and cholera-like vibrios has been established. Investigations on the nature of cholera toxin have shown that the vibrio forms toxin in old broth cultures from the amino-acids, chiefly in the arginine fraction. The protein bases found in a 10 days' cholera broth culture consist of two main fractions, volatile and non-volatile, the former being devoid of pharmacological activity on the tissues tested and the latter containing poisonous toxins which depress blood pressure and having destructive action on the secreting tubules of the kidney with intratubular oedema and also causing contractions of the pregnant uterus. It is still unknown whether cholera toxin is an endotoxin or an exotoxin and much more work is required on this subject. It was proposed to study the enzyme activity of the vibrio. Preliminary work on cholera toxin has shown that a cyanogen radical is produced by the vibrios, possibly not H. C. N. but some other organic compound. Positive reactions were obtained with silver nitrate, ferric chloride and a very faint colour with the Prussian blue test. The cholera vibrio was found to retard the entry of oxygen to a great degree, thus showing a tendency to create anaerobic conditions; moreover under a restricted supply of oxygen, the protein metabolism may stop at the stage of produc-

*B. asiatica*, *B. coriacea*, *B. nepalensis*, *B. vulgaris*, *Argemone mexicana*, *Coptis teeta*, *Toddalia aculeata* and *Coscinum fenestratum*. A study of the pharmacological action and therapeutic uses of berberine showed that this alkaloid is not very toxic and that it is absorbed fairly rapidly from the site of injection ; when given by the mouth the alkaloid can be detected in the urine within a few hours. Both the cardio-vascular and respiratory systems are markedly depressed by its intravenous administration. The drug has little or no action on the growth of bacteria, and, even in such concentrations as 1 in 200, intestinal bacteria grow well. Specific toxic action on some of the pathogenic protozoa, such as *Leishmania tropica*, however, has been established and it is now largely used in the treatment of oriental sore. Contrary to general belief, musk has not been found to possess any marked cardiac stimulant properties. Other drugs studied included *makaradhwaja*, thymol, menthol, camphor, Indian chenopodium and Indian ipecacuanha. Lieut.-Col. R. N. Chopra, I.M.S., under whose direction the investigations on indigenous drugs have been carried out, has published a book \* embodying the work so far done. Despite financial difficulties, a detailed study of the opium habit in the Punjab was completed.

The entomological section was engaged on an investigation into the rôle played by the annelids in medicine ; hemiptera ; myiasis ; coleoptera, coprid beetles ; hymenoptera ant-bite hypersensitiveness ; diplopoda (millipedes), etc. A paper giving an analysis of plague infection in villages in Bombay Presidency was sent for publication in the I. J. M. R. Its main purport was the determination of the important factors involved in "the carrying over" of plague from one plague season to another.

As the All-India Institute of Hygiene and Public Health was not formally opened during the year, instructional work for the D. P. H. class was still carried out in the Hygiene Department of the School. Research work was continued in connection with the isolation of *B. typhosus* and *Paratyphosus* from water and sewage and also on the differentiation of the *colon-aerogenes* group by special methods and the results were published in the I. J. M. R. Other work included (a) statistical investigation of Indian life tables, (b) experiments to test the larvicidal properties of young bamboo shoots ; these are used empirically by villagers in Southern India to prevent infection with guinea-worm, and (c) certain bio-chemical investigations.

The special research department continued its work on kala-azar, hook-worm, bowel diseases, leprosy, diabetes, filariasis and respiratory diseases.

*Kala-azar*.—The transmission of infection was finally proved, as Dr. L. E. Napier was able to confirm in two animals Shortt's observation that kala-azar could be transmitted to the Chinese hamster by the bites of *P. argentipes*. A few days after these sandflies feed on an infected human being, they can transmit the disease by biting susceptible individuals. Other

\* Indigenous Drugs of India, their medical and economic aspects. The Art Press, 20, British Indian Street, Calcutta, 1930. Price Rs. 15.

composition of common Indian foods. Financial aid to the School was also rendered by the Calcutta Corporation and the Royal Calcutta Turf Club, whilst the trustees of the late Mr. William Duncan, Woking, Surrey, donated a legacy of £1,000.

Close co-operation was ensured between the School and the All-India Institute of Hygiene and Public Health and classes for the D. P. H. course were held in both institutions. 36 post-graduate students attended the course for the D. T. M., 20 for the D. P. H. and 47 for the L. T. M. Of the 35 students who appeared for the D. T. M. examination, 29 passed; 18 out of 19 students passed the D. P. H. Part I and 18 out of 22 passed Part II; 29 of the 43 for the L. T. M. were successful.

A brief resume of the more important activities of the different departments of the School is contained in the following paragraphs:—

- (a) The Department of Tropical Medicine continued to study the causes of tropical splenomegaly and infantile cirrhosis of the liver. In the former, the main line of work was the study of the response of the reticulo-endothelial system and the methods of diagnosis and treatment; a study of the records of infantile cirrhosis of the liver in the western hemisphere has shown about 50 well authenticated reports of non-syphilitic cirrhosis in young children, the clinical characters and the pathological lesions corresponding to those found in India.
- (b) The Department of Bacteriology, Pathology and Helminthology concentrated on a study of the treatment of the phagedæna type of soft sore; dysentery carriers; the clinical value of bacteriological examinations of stools; bacterial colonies and their significance; the causation of Asthma and epidemic dyspepsia; and skin diseases.
- (c) The Protozoological Department devoted itself to malaria transmission; monkey malaria; human malaria; trichomonas of the cow; and the spirillum found in nasal smears of lepers.
- (d) The Serological and Immunological Departments, in addition to Wassermann, blood grouping and complement fixation tests for clinical purposes, continued to carry out the study of serum protein fraction variations.
- (e) In the Pharmacological Department, investigations in connection with indigenous drugs and drug habits in India were continued and the list of the papers published is given on page 386. Work on many important indigenous drugs has been completed. A powerful sympathomimetic alkaloid resembling ephedrine in action was discovered in *Moringa pterygosperma*, a plant commonly met with in the Sub-Himalayan tracts. A readily available source of ephedrine was also found in *Sida cordifolia* which not only grows wild but is cultivated in many parts of India. The isolation of ephedrine from these plants opens up another source of this drug. A number of berberine-containing plants were investigated, such as *Berberis aristata*,

Dr. Orkney has lectured to the D. P. H. class and drafted proposals for the institution of a course of instruction and a diploma or certificate in maternity and child welfare for women graduates. These proposals are now under consideration. Dr. Orkney also visited various provinces in order to acquaint herself with the maternity and child welfare work being carried on throughout India. She has prepared a very interesting report on her tour which should be of value in developing and extending this section of the Institute.

The All-India Institute of Hygiene will be affiliated to the Calcutta University and will have a staff not drawn from any particular province but the members of which will be specialists in their subjects. It will therefore be in a position to give a wide training in public health matters specially related to India as a whole. Eventually it may be anticipated that the D. P. H. of Calcutta will occupy a unique position amongst similar diplomas of other Indian Universities and will replace in the rules of the various provinces the position hitherto held by Diplomas of Public Health obtained in Great Britain or elsewhere. The Director and his staff will certainly have this ambition, amongst others, in front of them in starting their work. Five papers were published by members of the Institute staff (see page 386).

#### **\*School of Tropical Medicine, Calcutta.**

109. Lt.-Col. H. W. Acton, C.I.E., I.M.S., was Director throughout the year.

In addition to the usual 9 departments, various special research departments are engaged on leprosy under Drs. E. Muir and J. Lowe; on kala-azar under Dr. L. E. Napier; on hookworm under Dr. Maplestone; on bowel diseases under Capt. Pasricha; on diabetes (Mitra Scholarship) and on filariasis (Darbhanga Scholarship); a survey party is also at work in tea-gardens.

The Government of Bengal maintains the Carmichael Hospital for Tropical Diseases, providing 92 beds and 14 cabins, and controls the general administration of the School. The I. R. F. A. continued to give a grant to meet the salaries of the Professors of Pathology and Protozoology and in addition financed enquiries on (a) skin diseases, (b) blood changes in certain tropical diseases, (c) indigenous drugs, (d) drug addiction and (e) malaria transmission.

The tea, jute and mining industrial associations continued their annual grants, enabling investigations to be made into those diseases of practical importance to their communities. Dr. Napier planned to commence the study of those diseases particularly affecting tea-garden labourers. The endowment fund of the School finances three main sections and contributes more than half of the leprosy grant. The research on diabetes was financed by the Mitra Fund; that on filarial diseases partly from money donated by the late Maharaja of Darbhanga. The Governing Body of the Imperial Council of Agricultural Research have promised a grant of Rs. 12,000 for the formation of a Botanical Section in which it is hoped to study the nature and

---

\* Annual Report of the Calcutta School of Tropical Medicine and the Carmichael Hospital for Tropical Diseases, 1932. Bengal Government Press, 1933. (Gratis).

Public Health throughout the land. The staff of the Institute will, I know, leave nothing undone in the discharge of their duties to fulfil in every way the objects for which it has been established. I have to convey to them, on behalf of His Excellency the Viceroy, his sincere good wishes in the great task that lies ahead of them and an assurance of his continued interest in their welfare. I now have the honour to declare open the All-India Institute of Hygiene and Public Health."

Before the Institute was formally opened, accommodation was given to various research enquiries with the permission of the G. B. of the I. R. F. A. Dr. Linton came to the Institute early in May and during the year carried out an investigation of the carbohydrate elements in various types of cholera vibrios. Dr. Muir has been given accommodation for his work on the pathology of leprosy, and the kala-azar enquiry under Dr. Napier has also been housed since early August. Accommodation for Dr. Ukil's tuberculosis enquiry had hitherto been a matter of some considerable difficulty, but it has also been conducted in the Institute since April. The *Anopheles ludlowi* enquiry being carried out by the Public Health Department of the Government of Bengal is of considerable importance not only to Bengal but also to the rest of India. As the Malaria Survey of India is closely interested and as the matter is one in which Lt.-Col. Stewart has a close interest, this enquiry has been accommodated in the All-India Institute. Its findings are communicated from time to time to a committee appointed by the Government of Bengal of which the Director, Malaria Survey of India, is a member.

In addition to these researches and investigations, Dr. Ghoshal, Assistant Professor of Laboratory Practice, has continued his work on special media in connection with the isolation of *B. typhosus* and *B. paratyphosus* from water and sewage and also on the differentiation of the colon-aerogenes group by special methods. Papers on these subjects have been written for the I. J. M. R. and two papers were read at the Indian Science Congress in January, 1933. Facilities have also been given to Mr. N. K. Chatterjee under the direction of Dr. B. B. Brahmachari to work on the radio-activity of water and interesting results have been obtained which however will require to be repeated. Examination of material for radio-activity sent by Colonel McCarrison has also been carried out. Dr. H. P. Chowdhuri made statistical investigations of life tables in India and published a paper on the subject in the I. J. M. R. Dr. V. N. Moorthy also carried out some interesting experimental work on the larvicidal properties of young bamboo shoots which are used empirically by villagers in South India to prevent infection by guinea-worm. Dr. Moorthy published a paper on the subject in the I. M. G. and also submitted a paper to the Indian Science Congress on his later research. Dr. Mitter was engaged in carrying out some biochemical investigations.

Mention has already been made of the decision to hold in abeyance the section on Maternity and Child Welfare. The Women's Medical Service however generously offered to place the services of one of their officers at the disposal of the Institute to begin the work of the section. Dr. Jean M. Orkney, who has had considerable experience of such work in England and India, has for some months been at work organising the section. Having got in touch with local organisations, she has already collected a large amount of information on maternity and infant mortality and morbidity in and around Calcutta. This material has been incorporated in a valuable report which will enable local organisations to improve and extend their work.



but such as to make it imperative that he should stay indoors,—he is unable to be present here to-day. In the circumstances he has requested that I should perform in his stead the opening ceremony of the All-India Institute of Hygiene and Public Health. While I fully share the regret that you must all feel at His Excellency's enforced absence, I need hardly tell you that I count it a great privilege to be able to perform this function."

"Every important country has in recent years become alive to the necessity for an institution of this nature and, for reasons which have been lucidly explained by Colonel Stewart, India has now wisely followed suit."

"This fine building in which we are gathered, the site on which it stands, and its complete equipment, much of which has yet to be installed,—represent a munificent gift to India from the Rockefeller Institution—the total value of which amounts to approximately 18 lakhs of rupees. The world-wide benefactions of the Rockefeller Foundation are certainly without any parallel, not merely because of their unrivalled generosity, but also because of the extraordinary care and forethought which is taken to ensure that the best possible use is made of the huge sums which are distributed every year. The members of the Foundation insist on making a thorough preliminary survey of every field of activity in which their help is needed, and, acting on this principle, they sent to India one of their highly skilled experts, Dr. Carter, who made an exhaustive and sympathetic study of medical education in this country. As the result of his report, the Foundation made their generous offer of this All-India Institute of Hygiene and Public Health. What they stipulated in return was that the Institute should serve the whole of India, that the Government of India should undertake the responsibility for the adequate maintenance of public health teaching to be organised in six sections in co-operation with the School of Tropical Medicine, and that the scientific control of the Institute should be entrusted to a Governing Body constituted in such a way as to ensure single minded devotion to scientific endeavour by a staff chosen solely with regard to its competence. These conditions, far from being irksome restrictions upon the activities of the Institute, are useful safeguards for securing its permanent value to the people of India. The Government of India gratefully accepted the gift and entered into an undertaking to comply with the conditions laid down by the Foundation. It is most unfortunate that owing to the financial situation they have had to start the Institute with four sections only instead of six as was originally intended, but we hope that it will not be long before this deficiency can be made good."

"It may be appropriate, ladies and gentlemen, that I should here say a few words about the School of Tropical Medicine and Hygiene which forms the historical background of the new Institute as well as an integral part of the whole scheme. This School stands as a monument to the energy of Sir Leonard Rogers, whose great achievements in combating tropical diseases are known throughout the world. It was expected that his School would provide ample accommodation for the requirements of the teaching and research staff for many years, but the rapid growth of their activities soon showed its Director that a separate Institute of Hygiene was essential for the completion of the scheme. I am confident that history will now repeat itself and I feel that there could be no happier augury for the future of the Institute than the great success achieved by its forerunner—the School of Tropical Medicine. It is indeed gratifying to my Government to find that their action in assuming responsibility for the School has paved the way for establishment of this organisation, which will supply the needs not merely of Bengal but of the whole of India."

"A special word of thanks is due to Major-General Megaw for the unflinching interest and industry with which he has worked for the completion of this beneficent scheme. I wish also to thank all the members of the Constructional Committee for the efficient manner in which they have performed their voluntary task. The work was completed within the specified time and within the estimated cost. In achieving these happy results the Committee were greatly helped by Sir Rajendranath Mukherji, the head of the firm which constructed the building, who, I know, regarded the erection of this Institute as a labour of love rather than as a commercial undertaking."

"Colonel Stewart has happily stressed the point that the foundation of the Institute coincides with the opening of a new era in the history of India. India is now about to enter the gateway to further constitutional advance. Great opportunities entail great responsibilities, not lightly to be discharged, and functions which will influence profoundly the future welfare of the country and its people. But I am confident that the experience gained since the introduction of the Reforms Act and the establishment of Local Self Government has prepared administrators and legislators for the assumption of the onerous duties that lie ahead of them. Let them remember that good government and the health and welfare of the people march hand in hand. It is not too much to say that the future of this Institute will depend equally upon the wisdom and vision of the administrators of the country and upon the willing co-operation of the people."

"India owes an enormous debt of gratitude to the Rockefeller Foundation for their munificent gift and His Excellency the Viceroy bids me assure the Foundation that the Government of India will make the fullest possible use of the gift as a means of promoting the advance of

that a training in English conditions could not adequately meet the needs of those actively engaged in practical health problems of Indian districts and towns. The need for such training in India became imperative. Though most Indian universities were prepared to grant diplomas in public health, adequate facilities for training did not exist. In Bengal where district and municipal health officers became compulsory in 1914, temporary arrangements for training were made by the Director of Public Health."

"At this time Sir Leonard Rogers was actively engaged in his scheme of establishing a School of Tropical Medicine in Calcutta and his remarkable perspicacity quickly grasped the desirability of including advanced teaching of hygiene in the School of Tropical Medicine. A full time professor of hygiene was therefore included in the staff of the School of Tropical Medicine which was affiliated to the University of Calcutta for the purpose of instruction for the diploma of public health. Facilities for special instruction in hygiene were also provided at some other Indian universities."

"The Reforms Act of 1919 by removing the advisory control of the Government of India and placing on provincial governments full responsibility for public health in every respect within the province acted in some respects as a stimulus to local governments to enunciate and develop sanitary policies. A few did so though political dissensions prevented full advantage being taken of this opportunity. In the Calcutta School of Tropical Medicine classes of annual training for the diploma of public health were held and the numbers seeking admission from all over India increased. It became evident that these classes were fulfilling a definite requirement outside Bengal, and that as public health policies and activities developed in India and increasing responsibilities were being assumed by Indians, there should be some institution of an All-India character which would not only train graduates for the University D. P. H. but would provide those already engaged in public health work with facilities for training and for independent higher research. Such an institute would take up investigation in Indian health problems and questions and would moreover help to co-ordinate public health work all over India and might assist local governments and others in any manner possible."

"These ideas and possibilities impressed themselves on Major General Megaw and Major General Graham, then Director of the School of Tropical Medicine and Public Health Commissioner respectively, and were expressed clearly on several occasions in their annual reports. Dr. Carter of the Rockefeller Foundation during his frequent visits to India was enabled to study medical and public health questions very closely at first hand especially in their educational aspects. Independently he arrived at the same conclusions as General Megaw and General Graham, and when he found responsible opinion in India in agreement with his, he was enabled to lay before the Rockefeller Foundation his opinions and proposals, which prompted the Foundation to make in 1928 their munificent offer to the Government of India. This offer resulted in grateful acceptance and the first fruits of the Foundations' munificence are seen in this building which is now ready to start its work. On the use which India makes of this institution will depend its ultimate benefits. India stands now at a new gateway of increased freedom, responsibility, duties and I hope increased health. During the next few years, it will be my duty as Director along with my staff to study and observe the changing conditions and changing systems of administration in India, to devise courses of training and create opportunities for research and methods of practical application of knowledge and research for the development and progress of public health in India. Our success must depend largely on how Indian opinion and Indian administrators face their new opportunities and on the spread of knowledge, and on the growth of responsibility and co-operation in the masses of the Indian people. The opening of the Institute therefore happily coincides with the opening of a new era in the history of India and it would have been very fitting and appropriate that His Excellency the Viceroy who will inaugurate the latter should open the All-India Institute of Hygiene."

"It is a matter of great regret that His Excellency the Viceroy is unable to be here today owing to illness, but we are fortunate indeed in having Your Excellency here to open the building in his absence."

"Before asking Your Excellency to declare this Institute open I would ask your gracious acceptance of a gold key from Sir R. N. Mookerjee as a memento of this occasion."

"Sir Rajendra, whose intense devotion to the promotion of the welfare of his countrymen is well known, has taken a personal interest in the construction of this building much beyond that of his merely being the head of the firm which built it. From the very first the object of the building appealed strongly to Sir Rajendra and for his great personal interest and his practical assistance throughout we cannot thank him enough. I would therefore ask that Your Excellency will permit Sir Rajendra to offer you a gold key."

*His Excellency Sir John Anderson.*

"Colonel Stewart, Ladies and Gentlemen, His Excellency the Viceroy has asked me to convey to you all his great regret that owing to indisposition,—not I am glad to say serious

constructed the building. The following speeches were delivered at the opening ceremony :

*Lt.-Col. Stewart.*

"Your Excellency, ladies and gentlemen, the opening of this Institute marks a very definite stage in the evolution of public health in India, and it may be interesting on the one hand to trace shortly the events which have led up to its inauguration, and on the other to envisage the part which it is hoped it will play in the future development of public health and state medicine in India. India is at present faced with a coming fundamental change in its constitution and administration. As Sir George Newman has pointed out, development and progress in public health in England have always followed closely on political advancement and change. In India, evolution in these matters has been slower, but we may be assured that if the present impending changes in India are pregnant with possibilities and opportunities of extended power, responsibility and action to Indians, so will the demands of public health problems for consideration and action become more and more insistent and pressing on the future legislators and administrators of India. Such experience and wisdom and foresight as become available for general government and administration, will also be applied to health problems; for government and public health and welfare are indistinguishably connected. In envisaging policies and schemes of public health administration in India, we are prone to consider the history of the English system. Though state medical services of the various civilized countries have developed along very different lines, it is interesting to note that the English system has formed the basis of most of these organisations. The English state medical service was first based on the Elizabethan Poor Laws and was at first completely parochial. As the result of the work of Chadwick about 1840, it later became largely centralized. From 1875 began what one may call modern decentralization and a development of the principle of local responsibility, which has gradually developed and which finds definite expression in the Local Government Act of 1929. This Act enlarges and unifies local responsibility in every branch of state medicine and public health. Such decentralization is only possible in a highly organised community, and where public education in health matters has advanced to a point at which the intelligent co-operation of the community as a whole can be counted upon. It is not a principle to be blindly applied as such, but represents a stage of definite development."

"The medical officer of health has always been considered the mainstay and prop of the state medical service. The great Public Health Act of 1875 in England made it compulsory on every local authority to appoint a medical officer of health and since 1888 the possession of a diploma of public health has been practically essential. Facilities for specialised training have been available in the British medical schools and universities for over 50 years and have received, particularly lately, special attention from the General Medical Council of Great Britain. Sir John Simon who served the Local Government Board of England as its Chief Medical Officer from 1855 to 1877, may be taken as the prototype of the English public health scientific official—"always an administrator, never a legislator, forced to carry out his conceptions under the cloak of another's authority; developing caution and perspicacity in observing trends of thought which provide the security and at the same time the danger of sterility in this sphere today." The spirit of Simon is still that of the successful medical officer of health today; contentment with a judicious compromise and the accumulations of small effects in a big result."

"Indian public health policy may be said to have commenced in 1857 with the taking over of the civil administration from the East India Company by the Crown. As the result of a Royal Commission appointed in 1860 to enquire into the excessive mortality amongst the civil and military populations, Sanitary Commissions were appointed in the main provinces. Departmental jealousies and other causes however prevented much being done (except in Madras where the appointment of sanitary inspectors became obligatory in municipalities) and the Commissions up to 1906 consisted only of 1 officer who had no staff and few responsibilities or opportunities."

"The arrival of plague in Bombay in 1896 awakened the Government of India to its responsibilities and in 1912 a notable advance was made by the giving of grants from central to provincial revenues for the purpose of strengthening the central provincial sanitary staff and for making a start with the provision of district and municipal officers of health. Provinces were allowed to develop their own policies in the appointments of the latter class of officers. Some, like Bengal, adopted the English method of letting local bodies appoint their own health officers, while others mostly appointed a provincialised staff of district and municipal health officers. Provision for instruction and training in health work was meagre and up till 1914 practically all health appointments were held by men possessing British diplomas of public health. While such were suitable for administrative appointments, it was obvious

*Members.*

2. The Director-General, Indian Medical Service.
3. The Public Health Commissioner with the Government of India.
4. The Director, School of Tropical Medicine, Calcutta.
5. The Director, All-India Institute of Hygiene and Public Health, Calcutta.
6. One medical or scientific non-official member of the G. B. of the I. R. F. A. to be elected by that body.
7. One medical non-official member of the G. B. of the I. R. F. A. to be elected by that body.
8. One of the representatives of the Legislature (whether of the Legislative Assembly or of the Council of State) on the G. B. of the I. R. F. A., to be elected by that body.

*Secretary.*

The Public Health Commissioner with the Government of India and during his absence, the Deputy Director-General, Indian Medical Service, will act as Secretary.

Conditions of appointment and pay of Professors and Assistant Professors took some considerable time to settle, as references on various points both to the Secretary of State and the Rockefeller Foundation were necessary. Advertisements inviting applications for these posts have been issued and the expectation is that by October, 1933, the staff of 4 sections will have been appointed and work definitely begun.

A class of 24 students for the D. P. H. course was enrolled in October, 1932, the first to be based in the Institute. Twenty represented the maximum number that could be accommodated in the School of Tropical Medicine. Thanks to Lt.-Col. Acton, Director of the School, the practical class rooms there have been redesigned and reconstructed to take the larger number of students. As in previous years, bacteriology, protozoology, and entomology for Part I of the D. P. H. course continued to be taught in the School of Tropical Medicine and thanks are due to Lt.-Col. Acton and his staff for willing co-operation in carrying out this combined instruction. Other courses are given in the new Institute. The lecture rooms and practical laboratories have proved very suitable in design and lay-out.

The Institute was formally opened by His Excellency the Governor of Bengal on 30th December, 1932, in the presence of a large gathering of official and non-official ladies and gentlemen. His Excellency the Viceroy was unfortunately unable to perform the opening ceremony owing to indisposition. Lt.-Col. Stewart in inviting His Excellency to open the Institute gave a short account of the events leading up to its opening and His Excellency in declaring the building formally open, hoped that the opportunities now being made available for training in advanced public health would be fully taken advantage of by coming generations of Indian medical men. His Excellency during the course of the ceremony was pleased to accept a gold key from Sir Rajendra Nath Mukherji, K.C.I.E., K.C.V.O., head of Messrs. Martin & Co., who

(f) *Studies on V. cholerae* included extensive work partly in relation to the routine preparation of cholera vaccine and partly, in association with the League of Nations and the "Office International", on the preparation of high titre diagnostic serum and the characters of the "authentic" cholera vibrio. A series of tests on 70 strains of *V. cholerae* was carried out with a high titre serum prepared by Dr. Madsen at Copenhagen. Vibrios from a variety of sources were investigated as to cultural characteristics, biological reactions, antigenic structure, protective properties, virulence, etc. High titre sera were raised against many strains and much material has been accumulated. The results obtained have been of great value in regard to the selection of strains for the preparation of vaccine and of high titre sera.

(g) *Susceptibility of Indian-bred white mice to the toxic action of novarsenobillon*.—It was found that a very high mortality occurred in these animals injected with the standard dose. A standard preparation sealed *in vacuo* and imported in cold storage was obtained from the Medical Research Council and a large series of tests were under progress. The results so far indicate the necessity for the use of a distinctly lower dosage than the standard used in England.

The Director's report should be consulted for further details.

#### All-India Institute of Hygiene and Public Health, Calcutta.

108. In the report for 1931, it was pointed out that the financial crisis in India had postponed the opening of the Institute and necessitated the restriction of its initial activities to four sections, (a) Public Health Administration, (b) Vital Statistics and Epidemiology, (c) Malariology and Rural Hygiene and (d) Biochemistry and Nutrition. The sections temporarily held in abeyance were Maternity and Child Welfare and Sanitary Engineering but the Women's Medical Service generously offered to place the services of Dr. Jean Orkney at the disposal of the Institute to open the former. A short note of her work is given below. Several administrative matters in connection with the control and staffing of the Institute have now been satisfactorily settled. After consultation with the Secretary of State and the Rockefeller Foundation, the Government of India, Department of Education, Health and Lands, in their Resolution No. F. 55-19/32-H, dated 26th November, 1932, published the composition of the Committee of the G. B. of the I. R. F. A. which will maintain scientific control of the Institute and which will act as a recruitment and appointments board for the Institute. The Committee is as follows :—

#### Chairman.

The Member of the Governor General's Executive Council in charge of the Department of Education, Health and Lands, or the Secretary to the Government of India in the Department of Education, Health and Lands, if deputed by the Member by general or special order to act as Chairman on his behalf.

nococcus strains used have been maintained at virulence by mouse passages and only fully virulent strains showing capsulation were used; *B. influenzae* strains were renewed as frequently as possible.

467 specimens of pathological material were examined, including 132 Wassermanns, 46 agglutination tests for typhoid, paratyphoid, Malta fever, etc., the preparation of 57 autogenous vaccines and the examination of 41 disinfectants. The issue of various culture media, stains, re-agents, standard agglutinable emulsions, type cultures to public and private institutions was continued. A large series of stock cultures, imported from the Lister Institute, London, or isolated in India, was maintained.

The Institute library constitutes the central reference library for all medical research workers in India; a consolidated catalogue for it and for the libraries of the other large institutes in India was under preparation.

*Research work.*—A list of 11 papers published in the I. J. M. R. is given in the appendix to this section (page 386). The succeeding sub-paragraphs indicate the variety of problems dealt with.

(a) *Concentration of anti-venin.*—Experiments by the ammonium sulphate method yielded a twofold concentration of the original strength and those by the sodium sulphate method a 4— to 5—fold concentration. The latter method appeared to be suitable for large scale production of purified and concentrated anti-venin.

(b) *Anti-venin against Echis Carinata venom.*—A small batch of anti-venin against Echis venom obtained from goats was maintained and its keeping power under ordinary conditions of storage was being studied.

(c) *Immunisation of horses against snake venoms* on the stereotyped principle of progressively increasing doses at regular intervals produced ill-health and sickness among animals with poor and unsteady response to antigens; considerable modifications of dosage and time intervals were introduced and with simultaneous injections of anti-venin, a better and steady response to antigens was obtained.

(d) *Comparative value of strains of B. typhosus for the preparation of vaccine.*—In order to test the value of Rawling's strain, which is one of the components of T. A. B. vaccine, protection experiments on mice were made; these showed that this strain had a protective value equal to the recently isolated smooth strain.

(e) *Comparative value of the fractions of bacterial suspensions used for cholera vaccine.*—The Director reported as follows:

“The practice has been to prepare cholera vaccine by emulsifying the growth on agar roll-tubes with normal saline solution and to allow the sediment to settle for 48 hours; the supernatant fluid is then decanted and the sediment re-suspended. It has been found that the elimination of the supernatant fluid, which is discoloured by material extracted from the agar during washing, resulted in a lesser degree of reaction. A series of white mice were immunised with (a) the original whole washings, (b) the resuspended sediment, and (c) the supernatant fluid and subsequently given a dose of a virulent culture intra-peritoneally. It was found that a very high and almost equal protection was given by both the original washings and the vaccine made from the resuspended deposit, whilst very little protection was given by the supernatant fluid which ordinarily decanted.”

to the civil and military authorities, to municipalities and to private persons, etc., throughout India. Other issues included stock and autogenous curative vaccines, anti-venomous serum (anti-venin), normal horse serum and high titre sera for diagnostic purposes. Reserve supplies were stored to enable the Institute to comply at short notice with urgent demands. The price of cholera vaccine was reduced but certain local governments had undertaken the manufacture of this vaccine to meet their own requirements. This partly explained the decrease in the amount issued but a further reason was the large decrease in the incidence of cholera all over India.

Table VIII(i) gives the quantities in c.c.s of vaccines and sera issued in 1931 and 1932.

TABLE VIII(i).

	1932.	1931.
<i>Vaccines.</i>		
Prophylactic cholera. . . . .	409,170	1,048,540
Prophylactic T. A. B. . . . .	320,660	362,439
Prophylactic influenza . . . . .	14,462	55,386
Curative . . . . .	9,729 doses.	13,311 doses.
Autogenous . . . . .	510 doses.	643 doses.
<i>Sera.</i>		
Anti-venomous . . . . .	151,720	134,600
Normal horse . . . . .	14,520	11,760
High titre . . . . .	873	1,126

In addition to the above, anti-tetanic, anti-diphtheritic, anti-streptococcus, anti-meningococcus, anti-dysenteric and anti-anthrax sera were imported and issued on demand. Further work was done in respect of the keeping properties of vaccines and protection experiments confirmed that bulk stocks retain their prophylactic value much beyond the expiry period now in force. A careful revision of manufacturing processes was commenced and the value of the various procedures was under test. Considerable improvements were made in the manufacturing equipment.

A study of the factors involved in the preparation of cholera vaccine was commenced, particularly in regard to the suitability of different strains of the vibrio and the keeping properties of the vaccine. In the meantime, certain principles were adopted in the selection of vibrio strains. Only non-hæmolytic strains were used which must also show the criteria of smoothness including colony characters, salt and Millon-stability and uniform turbidity in broth. They were also required to show high agglutinogenic value, both *H* & *O* in a group of rabbits; their protective value for animals against intra-peritoneal infection with a virulent strain was also tested. In regard to the determination of authentic vibrios for the preparation of vaccines and of diagnostic high titre sera, the Institute was in touch with the work of the Health Committee of the League of Nations and the "Office International". The T. A. B. vaccine was as before prepared from two strains of *B. typhosus* along with paratyphoid A and B. The value of Rawling's and other strains was under investigation. Influenza vaccine was prepared from multiple strains of *B. influenzae*, Pfeiffer and *Pneumococcus*, types I and II. The pneu-

## SECTION VIII.

## LABORATORIES AND MEDICAL RESEARCH.

## Central Research Institute\*, Kasauli.

107. Lt.-Col. J. Taylor, I.M.S., succeeded Bt.-Col. Sir Rickard Christophers, I.M.S., as Director on 28th October, 1932. The latter retired on 1st September and Lt.-Col. J. A. Sinton, J.M.S., officiated as Director for the short interval. Other I.M.S. officers who served on the staff were Major G. C. Maitra, Captains Mulligan, Ahuja and Mallick. Researches under the auspices of the I.R.F.A. included (a) helminths by Dr. V. T. Korke; (b) Indian species of simuliidæ, culicoides and other blood-sucking midges by Dr. I. M. Puri; and (c) protozoological survey by Dr. J. C. Ray.

The Institute continued to function as the medical research and bacteriological laboratory of the Government of India; to conduct researches on bacteriological and immunological subjects; to examine and report upon specimens received for diagnostic purposes; and to carry out such bacteriological and other examinations as were required by Government. Routine work included the supply of cultures, etc., for serological work and the manufacture and issue of prophylactic vaccines and curative sera. Imported sera were stored and distributed and scientific stores were supplied as required. Assistance was rendered to various scientific workers.

A notable event was the visit paid to the Institute by Their Excellencies the Viceroy and the Countess of Willingdon.

The Director attended meetings of the central committee of the Pasteur Institute of India, of the S. A. B. and the G. B. of the I. R. F. A. and the 10th Conference of Medical Research Workers. The Director continued to act as Editor of the I. J. M. R. and Indian Medical Research Memoirs, 4 numbers (Nos. 22-25) of the latter being published.

Instruction in and facilities for the study of bacteriology and laboratory technique were continued; two persons were so trained.

The serum and vaccine section continued the manufacture of prophylactic vaccines for cholera, typhoid (T. A. B.) and influenza and issued these

---

\* Annual Report of the Central Research Institute, Kasauli, including the Annual Report of the Malaria Survey of India for 1932. Manager of Publications, Delhi. Price Rs. 2-6 or 4s. 3d.

*Abbreviations—*

I. R. F. A. .	Indian Research Fund Association.
S. A. B. .	Scientific Advisory Board of the Indian Research Fund Association.
G. B. .	Governing Body of the Indian Research Fund Association.
I. J. M. R.	Indian Journal of Medical Research.
I. M. G. .	Indian Medical Gazette.
D. T. M. .	Diploma of Tropical Medicine.



**B.—Indian States.****Mysore State.**

105. The Bureau of Sanitary Engineering of the Department of Public Health was engaged with problems relating to public water-supplies, public sewage, drainage and sanitary works, town improvements, construction of bore-hole latrines and composting of night soil and town refuse. The work of the bureau was considerably increased by the transfer to it of the control of all water-supplies in the State except that of Bangalore city.

During 1932, 4 new water works were installed, bringing the total number of piped water-supplies in the State to 29, these serving a total population of 691,991. Two existing water-supplies were improved and enlarged. 9 supplies, serving a total population of 86,335, were equipped with chlorinators. New designs and estimates were prepared for 20 water-supply systems, 16 of these being for bore-wells, 2 for infiltration wells, 1 for an impounded reservoir and 1 for an extension of the existing supply. Estimates and designs of 9 proposed water-supplies were investigated and the original designs modified and estimates reduced. Designs and estimates were prepared for improvements and extensions to 11 existing water-supply systems.

The collection of samples from drinking water-supplies were continued ; 1,497 samples were taken from municipal water-supplies, rural water-supplies, dug-wells, step-wells and tanks.

Plans and estimates were prepared for improvements to 4 drainage systems ; designs and estimates were prepared for 10 sewage systems and designs and estimates for improvements to 19 existing sanitary works.

In 13 municipalities surveys were undertaken for the investigation and design of town improvements.

A section for the construction of bore-hole latrines was organised with an assistant engineer in charge. 150 bore-hole latrines were excavated and squatting slabs and enclosures completed during the year.

The Bureau of Sanitary Engineering continued to assist in the composting of the night soil and refuse of Mysore city.

**Federated Shan States (Burma).**

106. The total income, including opening balances, was Rs. 56,56,782 ; Rs. 2,36,223 in towns and Rs. 54,20,559 in rural areas. A total of Rs. 1,57,346 was spent on public health measures, Rs. 79,052 in towns and Rs. 78,294 in rural areas. Expenditure on water-supplies amounted to Rs. 21,587 for urban areas and Rs. 6,320 for rural ; that on conservancy to Rs. 34,312 and Rs. 36,229, respectively and on drainage to Rs. 5,380 in urban areas only. Vaccination charges totalled Rs. 840 in urban areas and Rs. 27,990 in rural areas ; a sum of Rs. 12,749 was spent on markets and slaughter houses in urban areas.

amounted to Rs. 114, on conservancy to Rs. 366 and on control of epidemics to Rs. 19,447.

### Burma.

104. Of the total municipal incomes, over 22% was spent for public health purposes. The largest expenditure was Rs. 40,06,062 or nearly 66% of the total in Pegu division. About Rs. 8 lakhs were devoted to markets and slaughter houses. Epidemic charges fell by over 40% to Rs. 25,448.

*Water-supplies.*—In Kyaiklat, the water-supply scheme was held in abeyance. In Akyab, the water-supply was in a very critical condition as the water pipes required relaying, whilst owing to the breakdown of pumping plants in Mawlaik and Myingyan serious difficulty was experienced. The residents of Magwe, where the water works were completed some years ago except for the pumping station, had still to put up with a supply from shallow wells and from the river but arrangements were being made by the municipality to raise a loan for the completion of the scheme. In Mandalay, the existing supply from tube wells was inadequate and part of the population had to take water from surface wells, the river and the moat. Certain improvements were, however, carried out.

*Conservancy.*—Motor transport for night conservancy work was introduced at Wakema. In Mandalay, where day conservancy is carried out by bullock transport, an experiment designed to determine the value of motor lorry transport for this work failed to convince the committee that a change was desirable. In Prome, an effort made to carry out the removal of night-soil by day was later abandoned. The contract system of conservancy disposal was tried out in several towns but almost invariably proved unsatisfactory. The Insein municipal committee cancelled their conservancy contract and carried out the work departmentally with satisfactory results. The Toungoo authorities proposed to change to the departmental system after the present contract expired. In Pyapon, the night conservancy system was very unsatisfactory and improved scheme was prepared for adoption.

*Rural Sanitary Works.*—In rural areas out of an aggregate income, including opening balances, of Rs. 1,42,15,019, the sum of Rs. 9,69,133 was expended on public health works. This total included Rs. 2,30,943 on conservancy, Rs. 55,802 on water-supplies and Rs. 847 on drainage. Epidemic and vaccination charges amounted to Rs. 15,309 and Rs. 2,88,855, respectively; markets and slaughter houses cost Rs. 2,82,032.

*Public Health Board.*—Two meetings were held and 11 projects were considered. On account of financial stringency, no new works were funded except where government was already committed to the expenditure and the total contributions for public health projects approved during the year amounted to only Rs. 532 as compared with Rs. 28,851 in 1931. This small sum included Rs. 350 for anti-malaria measures in Mawlaik and Rs. 182 for erecting a fence round the septic tank at Kyaukpyu. Administrative approval was, as usual, accorded to various schemes. No works were completed during the year.

*Board of Public Health.*—No meeting of the board was held, but approval was accorded to the execution by the Superintending Engineer, Public Health, of the following works : (i) Bhimasharkar water supply ; (ii) Surat Khadi drainage ; (iii) Karad water supply improvements ; (iv) Chalisgaon drainage ; (v) Street drains in Dhulia ; (vi) septic tank latrines in the *Modikhana* at Sholapur ; and (vii) Sholapur water supply improvements. The more important schemes under investigation related to (i) the Amalner drainage ; (ii) Khed water supply ; (iii) Mahad water supply ; (iv) Chiplun water supply ; (v) Ratnagiri water supply ; and (vi) Kurla drainage. The total expenditure on works carried out by the Public Health Branch aggregated nearly Rs. 13,30,000. The grants-in-aid given by the Government to cover the full centage charges and the part cost of capital works amounted to Rs. 1,56,355 whilst rebate grants to the extent of Rs. 11,000 were also given.

### Madras Presidency.

102. *Water-supplies.*—New water-supply works were completed and brought into operation in 3 additional municipalities, so that now 37 municipal towns have protected water-supplies. The quality of these water supplies continued to be satisfactory. Improvements for existing supplies were in progress in 8 municipal towns, whilst in 7 others new water works were under construction.

In rural areas no new water-supply scheme was completed during the year. The Chodavaram water supply scheme remained in abeyance. Plans and estimates were prepared for 3 towns and the investigation of 3 other water-supply schemes was under consideration.

*Drainage.*—No new scheme came into operation during the year but further progress was made in the execution of the Bezwada and Salem drainage schemes. Two schemes were sanctioned for execution as funds permitted ; plans for the drainage of 1 town were completed ; plans for 5 others were under preparation.

In rural areas, investigations at Madanapalle and Paramakudi were completed ; but the *panchayat* board of the former town was unable to take up the scheme.

### Assam.

103. Expenditure for public health purposes dropped to 40% of the total municipal incomes, as compared with 42% in 1931. Epidemic charges, including up-keep of contagious and infectious diseases hospitals, decreased to Rs. 7,231.

The percentage of expenditure on public health to total income in municipalities and small towns varied between 63% in Gauripur town committee and 15% in North Lakhimpur town committee. Other high percentages were 54% in Nazira, 53% in Silchar, 52% in Habiganj and 51% in Jorhat.

The 19 local boards in the province spent Rs. 1,74,011 on public health measures including Rs. 78,850 on water-supplies. Expenditure on drainage

The municipalities in general continued to display a certain amount of activity in sanitation and made attempts to carry out ordinary improvements.

*Improvement of rural water supplies.*—No grants were made owing to financial stringency.

*Village Sanitation.*—The aggregate income of the 79 villages under the Village Sanitation Act amounted to Rs. 2,42,756, whilst total expenditure amounted to Rs. 2,26,654 including Rs. 3,366 on water supplies, Rs. 3,332 on drainage and Rs. 35,465 on cleansing operations. Total receipts of town fund and other villages under the *Mukaddam* rules aggregated Rs. 36,231 and expenditure to Rs. 24,212, including Rs. 501 spent on water-supply, Rs. 327 on drainage and Rs. 12,356 on cleansing operations. In *ryotwari* villages in the districts of Nagpur, Wardha, Betul, Jubbulpore, Saugor, Mandla, Nimar, Raipur, Bhandara and Balaghat Rs. 9,398 were spent on the improvement of water supplies. 75 new *panchayats* were established and 2 abolished, the total number being 601. On account of financial stringency, initial grants to the new *panchayats* were reduced. Very few *panchayats* imposed taxes or, having imposed them, made any real effort to collect them.

*Board of Public Health.*—No regular meetings were held but all papers were circulated to members.

### Bombay Presidency.

101. Excluding Bombay city, the 155 municipalities incurred an expenditure on public health of Rs. 75,23,066, a decrease of nearly Rs. 4 lakhs.

During 1932-33 the expenditure on public health measures per head of population was about 3½ rupees in Karachi city and an average figure of 2½ rupees in the remaining municipalities. Complete sanitary surveys of 17 towns were made and 61 towns were inspected or reported upon. General advice was given on health matters in all these cases and to numerous others in matters of water-supply, conservancy, prevention of the spread of disease and in measures of a more general nature; action was taken by many of the municipalities on suggestions made by the A. D. P. Hs. The Nasik system of trenching worked satisfactorily in 11 out of the 25 towns in Northern Registration District. The A. D. P. H., Sind Registration District, impressed on all local authorities the advantages of the Nasik system.

The aggregate income of the 27 district local boards and 222 taluka local boards totalled Rs. 1,90,14,609 and expenditure on public health works amounted to Rs. 7,91,087. Government distributed Rs. 1,00,000 for the improvement of village water-supplies. These grants, supplemented by allotments from local funds and private contributions, were expended on constructing wells, tanks, troughs and cisterns, in repairing old wells, in closing step-wells and in boring operations. 336 draw wells were constructed and 47 step-wells were converted into draw-wells.

*Committees.*—One village sanitary board at Siddapore in Kanara district functioned in regard to conservancy work during the year; many of the 551 sanitary committees and village *panchayats* carried out useful work.

*mela* at Hardwar and Rs. 20,000 for installing a booster pumping plant for the water supply of Agra cantonment.

### **Bihar and Orissa.**

98. Total expenditure on public health in the 58 municipalities amounted to Rs. 20,22,866, about Rs. 1 lakh less than in 1930-31, whilst the percentage spent on conservancy, water supplies and drainage rose from 31.4% to 33.6%. Expenditure on markets and fairs absorbed Rs. 53,973 ; and a further sum of Rs. 2,35,865, mainly met from government grants, was also expended.

District boards spent Rs. 5,70,715 or 3.5% of their income on public health against 3.8% in 1930-31. Expenditure on conservancy totalled Rs. 2,99,345, on water supplies Rs. 1,56,155 and on drainage Rs. 5,404 ; Rs. 17,973 were also spent for markets and fairs.

Sanitary works to the value of Rs. 10,56,069 were carried out under the supervision of the Superintending Engineer, Public Health Department, during 1932-33. Detailed schemes amounting to Rs. 5,74,928 and preliminary schemes amounting to Rs. 90,249 were prepared and submitted either to government or to local bodies.

### **Bengal Presidency.**

99. Excluding Calcutta, this province has 117 municipalities with an aggregate population of 2,314,851. Expenditure on public health works totalled Rs. 58,32,213, Rs. 11 lakhs more than in 1930-31, or 47.6% of the total income.

Municipal expenditure incurred on large sanitary schemes aggregated Rs. 26,59,202, the most important items being Bhatpara town improvement scheme (Rs. 21,10,365) ; North Chandpur water-supply scheme (Rs. 1,50,000) and English Bazar water-supply scheme (Rs. 1,14,000).

The total income, including opening balances, of 26 district boards with an aggregate population of 46,389,495 was Rs. 1,79,12,340 ; 28.7% of this total was spent on public health including 3.5% on water-supplies, 0.07% on drainage, 8.2% on sanitation and 1.4% on vaccination.

### **Central Provinces.**

100. A total of Rs. 23,30,541 or 28% of the municipal revenues was spent on public health as compared with 29% in 1930-31. Markets and slaughter houses absorbed Rs. 1,21,182. During 1932-33 government sanitary grants to municipalities and other local bodies amounted to Rs. 44,457, this sum including Rs. 30,000 for infant welfare work, Rs. 12,045 to cover 50% of the pay of health officers and sanitary inspectors, Rs. 1,252 to cover 50% of the pay of midwives and Rs. 1,000 for carrying out anti-malarial measures in Pachmarhi town. Grants aggregating Rs. 17,171 were paid to 9 municipalities to meet 50% of the expenditure on rat destruction work ; a grant amounting to Rs. 180 was also paid to the municipal committee, Jabulpore, to meet 50% of the salary of the assistant medical officer in charge of the isolation hospital.

TABLE VII (ii).

Municipalities.	Gallons per head per day.	Samples analysed.			Found unsatisfactory.		
		Chemical.	Bacteriological.	Total.	Chemical.	Bacteriological.	Total.
Benares . . .	37.1	2	550	552	..	3	3
Allahabad . .	31.1	8	565	573	..	10	10
Cawnpore . . .	39.7	8	2,535	2,543	..	718	718
Agra . . .	21.4	18	1,983	2,001	11	773	784
Lucknow . . .	30.2	8	192	200	..	16	16
Meerut . . .	14.5	6	408	414	..	..	..
Muttra . . .	12.5	4	242	246	..	45	45
Mirzapur . . .	21.8	2	66	68	..	27	27
Nainital . . .	14.1	4	114	118	..	7	7
Mussoorie . . .	29.7	5	129	134	..	9	9
Jhansi . . .	4.7	3	12	15	3	12	15
Dehra Dun . .	9.0	24	296	320	9	118	127
Fyzabad . . .	16.9	4	271	275	..	..	..
Unao . . .	11.8	2	27	29	..	18	18
Hardwar-Union	18.8	12	370	382	..	38	38
Aligarh . . .	3.6	9	104	113	..	5	5
Fatehpur Sekri	6.6	1	2	3	..	..	..
Kosi . . .	8.5	2	12	14	..	..	..

In nearly all the towns with piped water-supplies, water analysis was carried out as usual in municipal laboratories by M. O. Hs.; in a few cases samples were sent to the provincial Hygiene Institute. Steps were being taken to obtain analyses of all water supplies at different seasons,—winter, hot weather and monsoon,—at the provincial Hygiene Institute and to fix standards for these different times of the year.

*Board of Public Health.*—The board, which met twice during the year, had at its disposal Rs. 1,88,549. The amounts spent included (a) pilgrim centres (Rs. 62,149), (b) urban sanitation (Rs. 73,355), (c) rural sanitation and minor sanitary works (Rs. 38,330) and (d) other works (Rs. 14,715). The grant for pilgrim centres included Rs. 24,360 for an infectious diseases hospital at Hardwar, Rs. 20,000 for the construction of an additional tube-well at Hardwar and Rs. 12,000 for the production of cinema films for propaganda purposes. From the sum set apart for urban sanitation, the chief items of expenditure were (i) trial tube-well for Ghazipur (Rs. 18,000), (ii) Unao drainage scheme (Rs. 13,000), (iii) additional tube-well for Fyzabad (Rs. 11,765) and (iv) temporary water supply to Adh Kumbh *mela* of 1933 at Hardwar (Rs. 7,272). The amount meant for rural sanitation and minor sanitary works was expended on such works as small drainage schemes, construction of new sanitary wells and repairs to existing wells. Amongst “other works” were included the water supply scheme of Dewa fair (Rs. 11,400) and the maintenance of a temporary water supply during the *mela* of 1932 at the same centre (Rs. 1,715).

Loans to the value of Rs. 2,35,000 were sanctioned by the local government for sanitary projects. These included Rs. 1,00,000 for the Adh Kumbh

Expenditure on health works executed under the Superintending Engineer, Public Health Department, amounted to Rs. 26,22,243, a decrease of Rs. 2.5 lakhs. Items in this total included Rs. 1,92,397 on original water-works and special repairs, Rs. 15,66,068 on water-works maintenance, Rs. 4,77,898 on drainage and Rs. 3,85,880 on other works, whilst the sum of Rs. 3,44,354 was spent on constructional works. Projects to the value of Rs. 16,58,493 were finally sanctioned ; others to the value of Rs. 12,76,789 were submitted but not sanctioned ; projects estimated at Rs. 8,27,943 were under preparation. 19 schemes were delayed for want of staff.

*Water Supply.*—Improvements to many water supply systems were carried out. The most striking feature of municipal enterprise in regard to water supplies is the colossal losses which the tax-payer suffers with apparent complacency. Perhaps if he were capable of realising the amount lost annually he would not remain silent, the extent of the losses being only equalled by the impotence of authority to check or curb them. Unyielding opposition is encountered to any attempts at controlling distribution and to the fitting of meters. No interest is taken as regards the accuracy of records of quantity supplied and costs. Remarkable difficulty is experienced in obtaining and holding in employment proper staffs and the normal tendency is to starve supplies as far as replacements and repairs are concerned. Investigations in some municipalities showed that the scale of ferrule rating in vogue was very unfair where pressures were low, and that there was urgent necessity for adjustments to the scale generally used. With the progress of time and the increase in demand, it is becoming clear that many of the water supply systems have become far too large and important to be managed by local authorities ; this has resulted in proposed alterations in the Municipalities Act whereby local authorities, where they so desire, may transfer their duties under the Act to private utility companies with the consent of Government.

*Drainage.*—The vast improvements effected by drainage works have even been favourably commented on by the local authorities themselves and, in all instances where proper drainage works had been completed, betterment in the adjacent properties has been marked. In one instance, a scheme which cost several lakhs of rupees resulted in an even greater increase in the total value of the contiguous buildings and plots. In some works, the benefit is slowly negated by the failure of the local authorities to insist on property owners making arrangements for connecting the foul water from their premises to the public drains. The local authorities in such cases cite the poverty of the owners as an insuperable obstacle to bringing their bye-laws into action. The betterment in the value of property, however, refutes this argument and the real reasons seem to be that the value of the drainage works is either not sufficiently realized or other influences are at work which the boards are unable to control. The lack of skill on the part of some municipal staffs is a great drawback in certain cases. This is often evident in the manner in which drainage extensions are carried out and it is not an infrequent occurrence for the house connections to sewers to be unprovided with traps and storm water gullies to be similarly connected.

Table VII (ii) gives particulars of the consumption of water and the analytical results of the existing water supply systems during 1932.

in Ferozepore and Ludhiana of Jullundur division, and in Gujranwala district of Lahore division, many thousands of manure heaps were removed and deposited in manure pits and an additional feature was the introduction of ventilators in village houses, to the number of 25,000, in the district of Ferozepore alone. Other village improvements included the paving of lanes and open spaces and the construction of drains and cess-pools. Such work will doubtless receive considerable impetus from the special Commissioner of Rural Reconstruction who was appointed after the close of the year under review. If district boards, community councils and *panchayats* all co-operate, environmental hygiene in the villages should speedily improve.

*Sanitary Board (April, 1932, to March, 1933).*—The board, previously known as the urban sanitary board, held 3 meetings during the year. Owing to financial stringency, the activities of the board, in common with other spending departments, were of necessity seriously handicapped. A sum of Rs. 1,55,000 placed at the disposal of the board for grants-in-aid to local bodies, was fully utilised although only Rs. 763 was sanctioned for the improvement of rural water supplies. In addition, Rs. 37,309 was spent out of the sum of Rs. 50,000 kept as an emergency reserve. The grants included Bhiwani water supply scheme (Rs. 93,341), Hafizabad and Garhi Awan drainage and drainage of ponds (Rs. 29,876), Sheikhpura (old town) drainage scheme (Rs. 30,918) and Isakhel water supply scheme (Rs. 14,007). The board continued to tender advice in regard to important questions of public health policy brought to its notice and gave administrative approval to schemes placed before it.

#### Delhi Province.

96. Total expenditure on public health amounted to Rs. 10,44,312, a decrease of over Rs. 2 lakhs. The sums allotted to conservancy, water supplies and drainage were all considerably less than those of the previous year. Public health expenditure incurred by district boards was only Rs. 9,418 or 3·2 % of their total income.

The health departments of the urban areas of Delhi province were well organised but because of financial stringency, their activities were considerably curtailed. A joint water board was responsible for the supply of filtered water to New Delhi, Delhi city, the notified area, the civil lines, the fort area and the cantonment. Shahdara notified area had a water works scheme in hand. In other cases, shallow wells were the only source of supply. A joint sewage farm at Kilokri dealt with the sewage from New Delhi, large parts of Delhi city, the civil lines and the fort area. New Delhi has an excellent underground drainage system.

Villages have practically no drainage system and lanes and paths are allowed to act as drains. In a very few cases, attempts are made to provide *kutchas* drains but these are seldom kept in good condition.

#### United Provinces of Agra and Oudh.

97. The total income of municipalities was much the same as in the previous year and it is worthy of note that expenditure on conservancy, water supplies and drainage was well maintained, although the total percentage spent on public health showed a slight decrease.



### North-West Frontier Province.

94. Total expenditure in municipal towns and notified areas fell slightly as compared with the previous year, although the percentage of total income expended on public health measures reached the same level.

District boards had a total income, including opening balances, of Rs. 23,83,435 but they spent only Rs. 87,475 on public health. Of this minute proportion, Rs. 7,125 was devoted to water supplies, Rs. 3,541 to conservancy establishment and only Rs. 39 to drainage and sewage. These amounts were all considerably less than the corresponding expenditure of the previous year.

Government grants-in-aid to municipalities and notified area committees amounted to Rs. 15,030, including Rs. 6,680 for sanitary purposes in Peshawar, Rs. 5,985 in Kohat and Rs. 1,600 in Tank notified area. Similar grants to local bodies for water supplies and other public health purposes amounted to Rs. 31,617 including Rs. 22,000 and Rs. 5,617 for water supplies to the dry areas of Bannu and Kohat districts.

Only 7 of the 14 towns in the province had piped water supplies.

### Punjab.

95. Total expenditure on public health measures amounted to Rs. 38,56,303, or over Rs. 2 lakhs less than in 1930-31. In the 115 small towns, total income, excluding opening balances, and total expenditure on public health measures amounted to Rs. 10,13,895 and Rs. 3,25,672 respectively. Income derived from the sale of sillage and manure in 9 municipal towns amounted to Rs. 1,32,003.

The sanitary engineering department had under construction 37 public health projects, 16 for the provincial government and 21 for local bodies. 14 preliminary and 12 detailed projects estimated to cost Rs. 9,41,632 and Rs. 11,52,607 respectively were prepared by the engineers of the public health division. The most important of these were Pind Dadan Khan water supply reorganisation and reconstruction (Rs. 35,000), Sialkot water supply extension (Rs. 44,743), Pind Dadan Khan water supply (Rs. 2,08,149), modified estimate for storm water channel at Ferozepur (Rs. 82,572), Sakhi Sarwar water supply (Rs. 42,147), Akalgarh town drainage (Rs. 73,189), Khanewal drainage scheme (Rs. 1,60,389), Lalamusa drainage extensions (Rs. 1,07,068) and Baba Farid fair area, Pakpattan (Rs. 56,148).

The question of supplies of good water in rural areas where water is scanty was one of the problems which engaged further attention. During 1932, financial assistance for rural water supply schemes in waterless areas was given by government and substantial improvements were effected. Hundreds of hand pumps were installed and many village wells were cleaned. Work in connection with improvement of general sanitation in rural areas was being carried out in different areas in accordance with varying local needs and conditions. A considerable number of sanitary works of public utility were constructed voluntarily by public spirited individuals in both towns and rural areas.

The district community councils which work hand in hand with district boards have been actively concerned in regard to village sanitation. In the districts of Ambala, Karnal, Gurgaon and Rohtak of Ambala division ;

TABLE VII (a).—Provincial Expenditure on Public Health in Municipalities.

	Income.		Expenditure on P. H.		Expenditure on P. H. per cent. of income.	Expenditure on.			
	1930-31. Rs.	1931-32. Rs.	1930-31. Rs.	1931-32. Rs.		Conservancy. Rs.	Water-supply. Rs.	Drainage. Rs.	
British India	15,98,67,607	16,89,46,187	4,38,72,000	4,25,63,102	27.5	25.2	1,75,34,873	1,42,31,640	41,76,128
N.-W. P.*	26,78,474	25,35,204	4,22,892	4,00,118	15.8	15.8	2,94,668	42,768	32,582
Punjab	1,61,00,336	1,53,79,205	40,24,475	38,56,303	25.0	25.1	14,44,757	13,41,563	4,84,132
Delhi*	39,23,296	38,62,570	12,73,144	10,44,312	32.5	27.0	3,58,702	5,62,109	89,008
U. P.	1,97,69,467	1,97,23,675	55,39,970	54,94,880	28.0	27.9	25,07,300	17,80,757	6,67,002
B. & O.	61,15,983	60,14,792	19,22,717	20,22,866	31.4	33.6	11,25,659	5,85,907	1,74,761
Bengal	1,09,89,568	1,22,97,883	47,25,850	58,32,213	43.4	47.6	28,13,160	17,34,063	8,00,823
Delhi									
C. P.	92,69,252	81,77,582	26,72,124	23,30,541	29.0	28.5	11,72,640	6,16,487	2,13,442
Bombay	4,82,65,207	4,95,31,884	79,00,587	75,23,066	16.4	15.2	31,99,780	21,73,556	12,42,904
Madras	1,25,55,192	2,29,44,100	82,86,000	73,90,424	66.0	32.2	18,95,572	41,04,489†	..
Assam*	14,22,176	13,48,554	5,97,983	5,45,568	42.0	40.5	3,61,729	1,51,902	32,268
Burma	2,82,38,646	2,71,65,788	65,06,558	61,22,811	23.0	22.5	29,90,893	11,08,545	4,30,146

\* Figures are for the years 1931 and 1932.

† Including that on drainage.

wireless are talked of as possible amenities of the near future, at least to the larger villages ; and, sooner rather than later, the villager will make his voice heard and demand improved water supplies, suitable drains and latrine accommodation, prompt removal of refuse, clean roads and generally a more hygienic environment. And who will be prepared to deny him these simple primary necessities ?

A great deal of propaganda work has been carried out by Public Health Departments during the past 20 years but, until the teaching of hygiene finds a regular place in schools' curricula, little need be expected from this form of activity. The most promising feature of the present day is the educative advance which is bound to follow increased facilities for travel. Although many of the towns and cities are far short of the ideal in respect of sanitary provisions and standards, they are still in certain respects greatly superior to the ordinary village and the villagers who visit those larger centres obtain new ideas and conceptions which in the long run will provide, through a widely expressed public opinion, the necessary stimulus for promoting advance in health standards.

The new constitutional reforms which are shortly expected to fructify will place greatly increased powers in the hands of Indian legislatures and Indian politicians. But neither legislatures nor politicians can ordinarily go much ahead of public opinion and this is particularly true in regard to questions of health. That much remains to be done in India towards the development of a sanitary conscience is evident from the figures quoted in this section of the report. Only minute proportions of total income are allotted either by municipalities or district boards to even primary necessities such as water supplies, conservancy and the removal of sewage, whilst other health activities hardly ever appear at all. During recent years heavy retrenchments have been necessary in both municipal and district board budgets but in no section of those budgets has the pruning knife been more drastically used than in those of public health. This aspect of the question would be a cause for profound despair, were it not that evidences of a widespread demand for a higher standard of life are becoming more and more apparent. It behoves all those who are engaged in public health work to encourage that demand by every method in their power.

During 1931-32, the municipalities in British India, out of a total income of 17 crores of rupees, devoted approximately 4.25 crores or 25 % to public health.

Water supplies cost Rs. 1,42,31,846, conservancy Rs. 1,75,34,873 and drainage Rs. 41,76,128 as against Rs. 1,83,67,861, Rs. 1,43,10,382 and Rs. 46,77,520 respectively in 1930-31. The percentage expenditure on public health varied between 47.6 % in Bengal and 15.2 % in Bombay. Generally speaking it may fairly be said that neither municipal councils nor local boards have given sufficient attention or money to public health.

Table VII (z) gives for each province total municipal figures for income and expenditure on public health during the years 1930-31 and 1931-32. It also gives the amounts devoted to conservancy, water supplies and drainage respectively in each province during 1931-32. These figures will therefore not be repeated in the narrative paragraphs dealing with individual provinces.

## SECTION VII.

## PUBLIC HEALTH WORKS.

## A.—British India.

## General.

93. It is more than regrettable that environmental sanitation, which progressed so markedly during the past 50-60 years in England, should have failed to advance more quickly in India. In some of the larger towns, and especially where a properly qualified medical officer of health and a subordinate sanitary staff are employed, considerable progress has been effected, but in the rural villages,—the homes of the vast majority of the people of India,—little advance can be recorded. This is, however, not entirely the fault of the villagers; traditional methods continue to be practised because the people know no better, and they know no better because public health departments have been unable to obtain the budgetary appropriations necessary before public health and hygiene can be made the subject of practical demonstration. In a few isolated areas, valiant attempts have no doubt been made by Health Departments and District Boards to provide sanitary amenities, such as protected wells, rat-proof houses and stores and sanitary latrines, but even these efforts are few and far between and have all been seriously handicapped by the lack of funds. At the same time, the benefits which have accrued have been appreciated and the village populations concerned have indicated in no uncertain fashion their gratitude and their readiness to co-operate in the attempts made to improve their hygienic conditions.

Much has been said and written of the conservatism of the average Indian villager and repeated use has been made of that characteristic in framing opposition to expenditure on even the most elementary public health reforms. But old customs are gradually being abandoned and, with the development of modern motor bus transport, contact with the larger towns is giving to the country-man new conceptions of life. The isolated village life of former days is in fact rapidly disappearing. Electric light and

*Burma States.*—The staff comprised 2 district superintendents, 2 inspectors and 46 vaccinators. Vaccinations performed in the Federated Shan States numbered 120,969 (87,668 primary and 33,301 revaccinations), an increase of 38,823. Of the 71,203 known primary operations, 98·6% were reported as successful; and of the revaccinations 52·1%. The District Health Officers verified the results of 4,737 or 3·9% of the total; inspectors and head vaccinators verified 32·0% of primary cases and 15·7% of revaccinations.

*Mysore State.*—The number of vaccinators employed was 169. The Government of Mysore in their Order No. G. 9181-91-San.-7-27-107, dated 20th May, 1933, directed that the district vaccination staffs should be placed under the control of the full-time health officers of the districts of Mysore and Shimoga; previously, responsibility for the regulation and progress of vaccination as well as disciplinary control over the vaccinators was entirely vested in the Presidents of these local bodies, the public health department having no control over the vaccinators' work.

Lanoline lymph for 249,577 persons was issued from the Vaccine Institute, Bangalore. Vaccination operations amounted to 237,691 (151,106 primary and 86,585 revaccinations), each vaccinator on the average performing 1,406 operations. The success rate for primary cases was 83·4%, and for revaccinations 44·5%. Complications and sequelae were reported in 2 cases.

The cost per successful case was As. 6-10.

**Compulsory Vaccination.**

91. Table VI (*iv*) gives the number of towns in which the Vaccination Act was in force.

TABLE VI (*iv*).

	Municipal Towns and Notified areas.	Vaccina- tion Act in force in		Municipal Towns and Notified areas.	Vaccina- tion Act in force in
British India . . .	947	775	C. P. . . .	118	81
N. W. F. P. . . .	13	10	Bombay . . .	114	30
Punjab . . . . .	250	210	Madras . . .	82	82
Delhi . . . . .	3	2	Coorg . . . .	2	2
U. P. . . . .	85	85	Assam . . . .	25	23
B. & O. . . . .	58	58	Burma . . . .	74	74
Bengal . . . . .	118	118	Ajmer-Merwara .	5	..

In the Punjab, primary vaccination is now compulsory in 15 out of 29 rural districts and in 15 cantonments. In Madras Presidency, the new rules issued by the Madras Government in their G. O. No. 349 P. H., dated the 18th February, 1932, to enforce vaccination and revaccination, were not brought into force in most of the local board areas because the taluk boards concerned failed to notify the areas to which the rules were applicable.

**B.—Indian States.**

92. *Bihar and Orissa Feudatory States.*—In most of these States both vaccination and revaccination are now compulsory. The number of vaccinations performed was 212,330 primary and 302,602 revaccinations as compared with 208,006 and 305,619 respectively in 1931-32.

*Punjab States.*—Statistics of those Indian States which maintain their own establishments are given in Table VI (*v*).

TABLE VI (*v*).

	Vaccinations.		Success-rate.	
	P.	R.	P.	R.
Patiala . . . . .	62,667	46,798	99.5	78.4
Kapurthala . . . .	9,425	5,016	91.5	54.5
Faridkot . . . . .	5,207	3,245	99.0	49.6
Jind . . . . .	10,895	..	99.1	..
Behawalpur . . . .	28,718	4,147	99.9	85.1
Nabha . . . . .	7,951	456	92.5	89.4

*Bombay Presidency States.*—An average strength of 84 vaccinators performed 128,852 primary and 21,256 revaccinations. The success rate was 99.9% for primary cases and 75.6% for revaccinations. The average cost per successful case was As. 7-0.

revaccinations in 1931-32, the increases being largely due to the higher incidence of smallpox. In this connection the D. P. H. remarks :—

“ With an increase in the prevalence of smallpox there was a corresponding greater readiness on the part of the people to get vaccinated. It is to be hoped that with the spread of education it will not in the near future require an unpleasant stimulus such as an epidemic to make the people recognise the necessity of vaccination.”

Of the total, 706,410 vaccination operations (572,668 primary and 133,742 revaccinations) were successful. Successful vaccinations amongst infants under 1 year of age numbered 168,701; and amongst children between 1 and 6 years 312,615. The success rate of primary cases was 95.7%; that of revaccination cases 33.2%.

In 74 towns where vaccination was compulsory, the number of operations performed was 230,276 (61,002 primary and 169,274 revaccinations); 97.6% of primary cases and 36.4% of revaccinations were successful. Infantile successful vaccinations totalled 36,198, or nearly 2,600 in excess of the estimated number of surviving infants.

The A. D. P. H. or district health officers inspected 11% of the primary cases and 8% of the revaccinations and inspectors of vaccination or other officers 58% and 44%. Primary case success rates recorded by the officers of these two categories were 95% in each case; revaccination success rates were 34% and 29%. The percentage of success reported by vaccinators was 96% for primary cases and 33% for revaccinations.

The average cost per successful case was As. 9-10 as against As. 11-10 in the previous two years.

#### **Ajmer-Merwara.**

87. 23,850 vaccinations (21,623 primary and 2,227 revaccinations) were performed, the average number done by each vaccinator being 1,424. Persons successfully vaccinated numbered 39.9 p.m. of the population. The average cost of each successful case was As. 5-6.

The civil surgeon and the superintendent of vaccination were able to inspect 2% and 29% of the total vaccinations respectively, the percentages of success among those inspected being 99% and 98% respectively.

#### **Baluchistan.**

88. Eleven vaccinators performed 52,540 vaccinations as against 18,249 in the previous year.

#### **Andamans.**

89. Vaccinations numbered 689 (457 primary, 160 secondary and 72 revaccinations), of which 289 were successful. Dried lymph obtained from Java was used except for a few isolated cases done with glycerinated lymph from Meiktila (Burma). Dried lymph from Meiktila was tried as an experimental measure on 88 cases; the success rate was 44.2 %.

#### **Vaccination among Troops.**

90. Particulars regarding vaccination in the army will be found in Table B of the appendix to this section (page 383).

The district medical and health staffs inspected 10% of the primary cases and 12% of revaccinations, the success rates in these groups being 99% and 41% respectively. The health inspectors inspected 86% of the primary cases and 78% of the revaccinations, the success rates being 99% and 40%. The percentages of success reported by vaccinators were 99% in primary cases and 34% in revaccinations.

The average cost per successful case was As. 6-2 as against As. 7-3 in 1931-32.

### Coorg.

84. On an average, 11 vaccinators were employed, and 14,680 vaccinations (7,252 primary and 7,428 revaccinations) were performed. Success rates reported were 96% in primary cases and 60% in revaccinations. 226 infants were successfully vaccinated in Mercara and Virajpet towns. The average cost of each successful vaccination was As. 8-5.

### Assam.

85. Vaccination among the general population was performed by 429 departmental vaccinators; on the tea estates, this work was done by the garden medical officers; the railway employees were vaccinated by their medical officers; and in jails the work was done by the sub-assistant surgeons in medical charge. Vaccinations performed by all agencies totalled 685,829 (369,975 primary and 315,854 revaccinations). The average number done by each vaccinator was 1,489.

The combined success rate was 94.8% for primary cases and 62.4% for revaccinations.

The subordinate inspecting staff consisted of 9 inspectors and 20 sub-inspectors but 10 additional sub-inspectors were employed temporarily. The civil surgeons, A. D. P. Hs. and assistant surgeons inspected 6.7% of the primary cases and 3.8% of the revaccinations; the subordinate staff inspected 47% of the primary cases and 30% of revaccinations.

Of a total of 4,269 unprotected infants registered in towns where vaccination was compulsory, 49.5% were successfully vaccinated. The highest rates were recorded in the towns of Gauhati, Nowgong, Mangaldai and Sylhet where 79% to 99% of the infants were vaccinated; and the lowest in Sib-sagar (10%), Nazira (11%), Jorhat and Goalpara (14% each) and in Doom-Dooma (21%).

The average cost per successful case was As. 3-8.

### Burma.

86. The staff comprised 38 district superintendents, 80 part-time supervising officers, 30 inspectors of vaccination and 351 vaccinators. Temporary staff was, as usual, employed to deal with epidemics.

1,140,152 vaccination operations (637,649 primary and 502,503 revaccinations) were performed as compared with 540,865 primary and 355,215



The average cost per successful vaccination was Re. 0-13-0 against Re. 1-0-0 in 1931-32.

Vaccination in police lines and out-posts was regularly done ; at fair centres, similar work was carried out well in advance of the fairs.

At Karachi, 6,132 Hedjaz pilgrims, including 4,971 males and 1,161 females, were revaccinated during the months of April, November and December, 1932, and January to March, 1933, by a temporary staff at a cost of Rs. 778-6-6.

### Madras Presidency.

83. The number of vaccinators increased to 839 in 1932-33 whilst the total number of probationary vaccinators was further reduced to 21. The tendency among taluk board authorities was to replace 1st class by 2nd class vaccinators in as much as the control of epidemic disease is now a charge on district boards but, owing to the prevalence of smallpox, a number of temporary vaccinators were employed. In addition 278 health inspectors, as compared with 285 in 1931-32, were employed, this decrease being due to financial retrenchment. The average number of operations done by each vaccinator was 3,540.

Vaccination operations totalled 2,759,275 (1,406,717 primary and 1,352,558 revaccinations) as compared with 1,508,024 primary and 597,813 revaccinations during 1931-32. The decrease in the number of primary vaccinations was chiefly due to the reduction in the number of unprotected children as a result of active work in previous years ; in the case of revaccinations, the marked increase was due to the introduction of compulsory revaccination and the greater prevalence of smallpox. Of the total operations, 70.3% were successful as against 81.8% in 1931-32. The success rate for primary vaccinations was 98.6%, the highest rate recorded during the last 10 years ; for revaccination cases the success rate was 38.6%.

The number of operations performed in rural areas was 2,262,475 ; in municipal areas, 463,010. The provincial success rate p.m. of population was 35.6, district rates ranging between 61.6 p.m. in the Nilgiris and 28.6 p.m. in Salem district. In rural areas, successful vaccinations among children under 1 year of age numbered 617,371, the proportion of vaccinations to births registered varying between 63.8% in Madura district and 26.0% in Ramnad district. In municipalities successful vaccinations among children under 1 year of age numbered 83,191, the proportion of vaccinations to births registered varying from 100% in Sivakasi to 30% in Chittoor. As usual, routine vaccination was suspended during the hot weather months, the off-season being utilised for intensive birth and death verifications. The health staff during these months detected 270,000 unprotected cases, the largest numbers being recorded in the districts of East Godavari, Madura, South Kanara, South Arcot, Chittoor, Ganjam, West Godavari, Kistna and Kurnool.

During the year under report, it was decided to reduce the number of vaccination insertions from 4 to 2, the purpose being to reduce both general and local reactions and thereby to attempt to popularise vaccination work. The results of this experiment will be watched with considerable interest particularly as regards comparison of the degrees of immunity obtained with the larger and smaller number of insertions.

248.9 p.m. of the available infant population was successfully vaccinated, the corresponding rates being 227.5 p.m. in rural areas and 649 p.m. in municipalities.

The district health officers and civil surgeons of Darjeeling and Chittagong Hill Tracts reported percentage success rates of 95% for primary cases and 72% for revaccinations amongst the numbers inspected; the rural health officers, sanitary inspectors and vaccination inspectors recorded success rates of 94% and 60% and municipal superintendents and assistant superintendents of vaccination recorded 91% and 40% of success respectively.

The linear incision method of vaccination was successfully adopted in every district and municipality and was unanimously reported to be much superior to the old scarification method.

The average cost per successful vaccination was As. 1-9 as against As. 2-0 during 1931-32.

### Central Provinces.

81. The staff comprised 35 assistant superintendents and 324 vaccinators.

662,691 vaccinations (562,633 primary and 100,058 revaccinations) were performed, the average number done by each vaccinator being 2,060. The prescribed minimum of 2,000 operations per vaccinator was not reached in 8 out of the 22 districts.

Out of a total of 578,250 unprotected infants under 1 year of age, 391,900 or 68% were vaccinated. In municipal towns unprotected children numbered 9% of the total against 20% during 1931-32.

Civil surgeons inspected 4.2% of the primary cases and 2.4% of the revaccinations; assistant superintendents, etc., 52% and 20%. The percentage success rates recorded for primary operations done by vaccinators, assistant superintendents of vaccination and civil surgeons were 93.3%, 86.9% and 89.2% respectively; those for revaccinations were 42.5%, 32.7% and 23.1%.

The average cost per successful vaccination was As. 5-11 as against As. 6-7 in 1931-32.

### Bombay Presidency.

82. Primary vaccinations numbered 710,123 and revaccinations increased from 115,955 in 1931-32 to 529,733 as a result of mass vaccination work carried out by the A. D. P. Hs. The success rate among primary cases was 92.7% while that of revaccination cases was only 19.2%, as results of the latter category could not be ascertained in 65% of the total. 65.4% of the primary cases were among infants under 1 year of age and 25.3% among children between 1 and 6 years.

A. D. P. Hs. or civil surgeons inspected 2.6% of the primary cases and 0.3% of revaccinations; superintendents or other officers inspected 26.2% of primary cases and 2.1% of revaccinations. The percentage success rates recorded by the former were 99% for primary cases and 25% for revaccinations; those recorded by the latter were 99% and 24%; and those by vaccinators 92% and 11%.

superintendents of vaccination and other inspectors inspected 37·4% of the primary cases and 15·1% of the revaccinations.

The cost per successful case was As. 4-2.

### Bihar and Orissa.

79. The provincial staff included 20 district inspectors, 64 sub-inspectors, 1,165 licensed and 275 paid vaccinators. Vaccination work was carried out generally under the licensing system except when outbreaks of smallpox necessitated the employment of paid vaccinators.

1,548,636 operations (1,102,435 primary and 446,201 revaccinations) were performed, an increase of 342,008 cases. The D. P. H. in this connection remarks :—

“ Vaccination is not yet a popular measure with the masses in the province. When smallpox is prevalent the people show their willingness to have their children protected and in 1926 and 1927 when the disease raged in epidemic form, a greater number of vaccinations were recorded. In 1929 there were fewer cases of smallpox in comparison with 1928, so that there was not therefore the same incentive.”

1,509,584 operations (1,100,409 primary and 409,175 revaccinations) were performed by the vaccination staff but the success rate fell to 84·4% as compared with 93·9% in 1931-32. Success rates in municipal areas were 96·7% in primary cases and 47·0% in revaccinations ; in rural areas 99·4% for primary cases and 43·4% for revaccinations.

Unprotected children numbered 1,158,450, of which 243 p.m. were vaccinated successfully. In municipal areas, 619 p.m. of the surviving unprotected infant population were successfully vaccinated ; these figures were unsatisfactory as they show that far more than half the total operations were performed on children over one year of age.

The cost per successful case was As. 1-11.

### Bengal Presidency.

80. The staff, including those in Calcutta, numbered 103 inspectors of vaccination and 1,894 vaccinators ; of these 80 inspectors and 1,660 vaccinators were employed in rural areas.

Vaccination operations numbered 6,685,223 (2,522,872 primary and 4,162,351 revaccinations), an increase of 71,843 primary and 1,070,780 revaccinations as compared with 1931-32. The success rate for primary cases was 90% ; for revaccination cases 43%. 31,552 vaccinations were performed in tea-gardens, 75,123 in factories, 24,971 in railways, 970 on steamers and 69,973 in jails. The number of successfully vaccinated children under 1 year of age decreased by 1,343 whilst among those between the age of 1 and 6 years an increase of 4,973,138 was recorded, the total number of children successfully vaccinated in these two groups being 291,920 and 6,467,550 respectively. Vaccination operations performed during the recess period numbered 1,108,466 (484,628 primary and 623,838 revaccinations). In rural areas, 2,366,656 primary vaccinations and 2,737,928 revaccinations were performed, both groups showing considerable increases as compared with 1931-32.

entry to private houses for their work; hence the necessity for training and appointing female vaccinators for this work.

"By school medical inspection large numbers of unvaccinated children and those who required revaccination came to notice."

The success rates for primary vaccinations and revaccinations were 95% and 44% respectively. The average number of persons vaccinated by each vaccinator was 13,563. Of 28,051 unprotected infants, 19,409 were successfully vaccinated; 3,147 of these were among children between 1 and 6 years of age.

The cost per successful vaccination was As. 1-11 as against As. 5-4 during the preceding year.

### United Provinces.

78. The staff comprised 45 assistant superintendents and 945 vaccinators.

The number of operations performed increased by 226,718 as compared with the preceding year, the actual number being 1,723,642 (1,446,587 primary and 277,055 revaccinations). Each vaccinator averaged 1,797 operations. 95.6% of the primary and 33.5% of the revaccinations were successful. 30 persons were successfully vaccinated p.m. of population, the best protected districts being Almora, Garhwal, Dehra Dun, Saharanpur and Lucknow and the less protected Mainpuri, Hardoi, Shahjahanpur, Allahabad and Farrukhabad. The percentage of successful operations to total births was only 51.8% among children under 1 year of age; 25% among those between 1 to 6 years; but the figure was 81.5% for all ages. Vaccinations performed by medical subordinates at dispensaries totalled 1,031 (262 primary and 769 revaccinations).

In municipalities, 282,625 operations (135,035 primary and 147,590 revaccinations), were performed, the rate of persons successfully vaccinated being 44 per 1,000 of population. Vaccinations of children under 1 year of age totalled 82,263. Mussoorie headed the list with 182.7 p.m. and other rates were Almora (144.5), Ghaziabad (96.4) and Rae Bareilly (94.9). Very low rates were recorded in Mainpuri (20.2 p.m.), Shahabad (20.2), Pilibhit (23.4), Nagina (23.8) and Bijnor (24.0).

In cantonments, 21,130 vaccinations (5,342 primary and 15,788 revaccinations) were done. Of these, primary successes totalled 4,973 and revaccinations 4,704. About 48 p.m. of the total population were successfully vaccinated during the year. Chakrata was again the best protected cantonment with a rate of 357 p.m.; the worst was Dehra Dun (5.8 p.m.).

In notified areas, 18,804 vaccinations (15,328 primary and 3,476 revaccinations) were done, of which 15,024 (14,087 primary and 937 revaccinations) were successful. Out of every 1,000 persons 36 were successfully vaccinated. Mainpuri civil station was best with a rate of 70.9 p.m. and Rikhikesh was last with a rate of only 10.3 p.m.

The vaccination state of school children was as usual inspected by the public health staff, a total of 35—36,000 scholars being vaccinated in their presence.

The A. D. P. Hs., district M. O. Hs., and civil surgeons inspected 12.8% of the primary cases and 2.3% of the revaccinations, whilst the assistant

vincial staff did 82,285 operations (26,603 primary and 55,682 revaccinations) ; and the dispensary staffs 9,435 cases (1,715 primary and 7,720 revaccinations).

In cantonments, 61,143 operations (6,959 primary and 54,184 revaccinations) were performed.

5,391 vaccinations (1,098 primary and 4,293 revaccinations) were done by railway medical officers amongst persons residing in areas under the jurisdiction of the North-Western Railway.

The rate of success among primary cases was 98.4% ; that of revaccinations 69.8%.

A. D. P. Hs. inspected 5,169 primary and 8,767 revaccinations ; civil surgeons and district and municipal M. O. Hs. 174,157 and 390,265 ; and superintendents of vaccination 410,663 and 797,767 respectively. The percentage successes in primary cases and revaccinations for these 3 categories were 95% and 44% ; 97% and 61% ; and 96% and 58% respectively. The success rate reported by vaccinators was 98% in primary cases and 69% in revaccinations.

The cost of each successful vaccination was As. 2-4 as compared with As. 4-4 in 1931-32.

### Delhi Province.

77. The 4 municipalities employed 9 whole-time vaccinators ; 29 other vaccinators were engaged temporarily during the smallpox epidemic. In rural areas, vaccination work was carried out by 3 whole-time vaccinators ; 2 additional vaccinators were employed temporarily during the smallpox epidemic.

A total of 189,883 vaccinations (34,275 primary and 155,608 revaccinations) were performed as compared with 20,766 primary and 7,145 revaccinations in 1931-32, the increase being due to the greater prevalence of smallpox during the year. The A. D. P. H. remarks :—

“ Vaccination is closely connected with the results produced by the incidence of smallpox. The doubts expressed in last year's report, as to whether entire trust can be placed on all vaccination returns which go to make up the end result for the year, unfortunately were confirmed with the outbreak of the epidemic of smallpox in the winter of this year. Greater supervision of the vaccinators and their records, and consequently a more accurate method of case checking against the vaccinators return, is certainly required.

“ Further there is a definite public prejudice in Delhi against vaccination in the hot weather. In addition to this many parents try to remove the lymph by means of hot water after their infants have been vaccinated. This helps to falsify the results. Again it may be mentioned that there is no properly organised revaccination against smallpox. The vast majority of the population do not realise the necessity of such systematic revaccination during non-epidemic years.

“ The isolation of smallpox cases occurring in heavily congested areas like Delhi City cannot be truthfully admitted to exist ; in fact there is a distinct tendency towards the concealing of cases, resulting in the fact that many cases go unnoticed with the spread of the disease. There is no proper isolation hospital near the city for such cases, hence the reason for non-isolation apart from the prejudice of people to go to hospital. All these factors tended to the accumulation of a large number of non-immune or partially immune persons. It only required the introduction of a potent virus to produce an epidemic outbreak.

“ The introduction of the system of vaccination by the Health Visitors attached to the welfare organisations has added to the number of infants immunised against the disease, yet these workers are so busily employed with their own duties that in no sense can they be regarded as taking the place of the public vaccinators. It is difficult for male vaccinators always to gain

### North-West Frontier Province.

75. The staff consisted of 6 superintendents of vaccination and 43 vaccinators (including 4 temporary vaccinators).

Persons vaccinated totalled 306,733 (177,115 primary and 129,618 revaccinations) as against 213,856 in 1931-32. 43,190 persons were vaccinated in the agencies. Each vaccinator averaged 7,133 operations, the number ranging from 8,765 in Hazara district to 5,916 in Kohat district. Successful primary operations totalled 169,733, including 93,284 amongst infants under 1 year of age and 60,751 among children between 1 and 6 years; successful revaccinations totalled 94,087. The rate of successful vaccinations was 76 per 1,000 of the population.

Of the 306,733 persons vaccinated, 205,241 were inspected (121,814 primary and 83,427 revaccinations). Recorded success rates were 98% for primary and 89% for revaccinations by civil surgeons and 99% and 85% for those done by superintendents of vaccination.

The average cost per successful operation was As. 1-7 as compared with As. 2-1 in 1931-32.

### Punjab.

76. The strength of the staff employed by local bodies increased from 514 vaccinators to 554 in 1932-33; superintendents of vaccination from 40 to 43. In spite of financial stringency, the *thaneewar* system of employment of vaccinators was vigorously enforced and the special staff remained unchanged. Each vaccinator averaged 6,350 operations as compared with 3,236 in 1931-32. The D. P. H. remarks in this connection :—

“It is not so much a measure of capacity of a vaccinator during normal times as it is an index of the potentiality of the organisation which has developed during recent years and which could be set in motion on the first indication of a threatened epidemic.”

Women vaccinators were employed in certain municipalities; in some others, health visitors assisted but the employment of the latter on vaccination work is still in the experimental stage. In view of the peculiar social conditions, great scope exists in this province for the employment of female vaccinators and the D. P. H. expresses the hope that the numbers of women so employed will increase and that their work will show improvement both in quantity and quality.

3,607,285 vaccinations (1,003,564 primary and 2,603,721 revaccinations) were performed as against 1,718,983 in 1931-32, this being the largest increase ever recorded in the history of the province. The D. P. H. remarks that these figures are a token of the potential energy of the reorganised public health department, which can be liberated whenever an outbreak of infection threatens. He further states that they are attributable to the routine propaganda campaign carried out day by day with a view to the popularisation of public health measures. They also bring into prominence the stupendous nature of the task still to be undertaken before attaining desired results and the necessity for further development of the department. 3,454,422 vaccinations (968,287 primary and 2,486,135 revaccinations) were done by district and municipal staffs; of this total, 713,259 vaccinations (116,708 primary and 596,551 revaccinations) were done in urban areas. The special pro-

*Manufacture.*—Supplies for the N. W. F. P. were obtained from the Punjab Vaccine Institute. In the Punjab, vaccine lymph was prepared according to the Forster-Java method. At the Vaccine Institute of B. & O. at Namkum, rejuvenation of seed vaccine was obtained by passage through rabbits, buffalo-calves and cow-calves. At the Bombay Vaccine Institute, further experiments were carried out with the view of obtaining a greater yield of vaccine pulp per calf. In the King Institute, Madras, the usual Nijland's cycle for seed lymph, *viz.*, cow-calf, rabbit, buffalo-calf, cow-calf, gave further increases both in yield and potency. At the Burma Vaccine Institute at Meiktila, passage was made through a modified Nijland cycle, *viz.*, rabbit, cow-calf, buffalo-calf and rabbit.

*Yield.*—In the U. P., the average yield of crude lymph was 51.8 grammes per calf, an increase of 0.4 grammes; the average yields of crude lymph per cow-calf and buffalo-calf were 13.3 and 55.7 grammes respectively. In Bengal, the average yield was 339 grains per calf whilst in the C. P. the average was 74.2 grammes per buffalo-calf, 42.11 per cow-calf and 1.1 per rabbit. At the King Institute, Madras, a more economical production of lymph was devised, the average yield per calf being 28.4 grammes compared with 26.2 in the previous year. In Burma, the average yield was 200.6 grammes per buffalo-calf and 51.4 per cow-calf.

*Storage.*—In the U. P., the cold storage plant and the electric installation worked satisfactorily, as also did the cold storage in B. & O. The new cold room in Bombay Presidency continued to maintain suitable temperature conditions.

*Tests.*—In the U. P., proposals were submitted to Government for the opening of a laboratory at the vaccine dépôt in order to carry out complete bacteriological purity tests and animal tests for estimating potency by up-to-date methods. In Bombay Presidency, the purity of all lymph was tested as usual. In Burma, all lymph before issue was subjected to Cunningham's potency test on cow-calves and to the Calmette Guérin potency test on rabbits.

*Training.*—Training classes in vaccination were held as usual in the various provincial institutes.

Table VI (*iii*) gives details of the lymphs produced and issued from the various provincial vaccine institutes.

TABLE VI (*iii*).

Vaccine Institutes.	Number of doses.	
	Out-put.	Issues.
N. W. F. P. } Lahore . . . . .	8,697,068	7,884,175
Punjab . . . . .		
U. P., Patwa Dangar . . . . .	4,101,612	3,218,750
B. & O., Namkum (Ranchi) . . . . .	4,819,031	3,088,742
Bengal, Calcutta . . . . .	12,724,208	7,333,116
C. P., Nagpur . . . . .	734,505	721,645
Bombay, Belgaum . . . . .	2,761,060	1,651,555
Madras, Guindy . . . . .	*3,472,164	*3,482,660
Assam, Shillong . . . . .	992,112	944,378
Burma, Meiktila . . . . .	1,733,324	1,578,108

\* For the period 1st Oct. 1932 to 30th Sept. 1933. The figures refer to the four insertion rates from 1st Oct. 1932 to 14th July 1933 and the two insertion rates from 15th July to 30th Sept. 1933.

TABLE VI (i)—*contd.*

		Vaccinations.		Per cent. success.		Cost per successful case.		
		P.	R.	P.	R.	Rs.	A.	P.
Bengal .	1931-32	2,451,029	3,091,571	90.9	48.8	0	2	6
	1932-33	2,522,872	4,162,351	89.6	43.4	0	1	9
C. P. .	1931-32	532,467	107,559	91.9	42.0	0	6	7
	1932-33	562,633	100,058	93.3	44.0	0	5	11
Bombay .	1931-32	640,033	115,956	99.0	43.5	1	0	9
	1932-33	710,178	529,742	99.0	54.6	0	13	0
Madras .	1931-32	1,508,024	597,813	98.4	37.0	0	7	3
	1932-33	1,406,717	1,352,558	98.6	38.7	0	6	2
Coorg .	1931-32	6,784	7,747	96.8	63.6	0	8	7
	1932-33	7,252	7,428	95.8	59.9	0	8	5
Assam .	1931-32	341,463	263,583	93.0	58.3	0	4	5
	1932-33	369,975	315,854	94.8	62.4	0	3	8
Burma .	1931-32	540,865	355,215	97.0	31.7	0	11	10
	1932-33	637,649	502,503	95.7	33.2	0	9	10
Ajmer-Merwara	1931-32	18,511	256	95.0	87.9	0	7	0
	1932-33	21,623	2,227	93.9	91.9	0	5	6

Of the 20,587,799 vaccinations, 8,679,873 or 42% were inspected by the public health and vaccination staffs. Table VI (ii) gives details:—

TABLE VI (ii).

Inspected.	Per cent. success in total inspected by							
			A. D. P. Hs., Civil Surgeons, D. H. Os., etc.		Superintendents of Vaccination, Health Inspectors, etc.		Vaccinators	
	P.	R.	P.	R.	P.	R.	P.	R.
N. W. F. P.	121,814	83,427	98.4	88.8	99.2	85.4	98.4	80.2
Punjab .	589,989	1,196,799	94.5	59.9	95.9	57.8	98.4	69.8
Delhi .	11,864	20,003	..	..	53.6	16.9	95.4	44.4
U. P. .	716,478	47,031	94.2	21.4	94.5	26.5	95.6	33.3
B. & O.	535,943	40,006	99.3	33.5	98.0	88.3	99.3	47.1
Bengal .	819,101	773,240	95.3	71.7	91.3	39.9	89.7	43.2
C. P. .	312,077	19,723	89.2	23.1	86.9	32.7	93.3	42.5
Bombay .	203,862	12,179	99.5	25.2	99.0	23.6	92.0	10.7
Madras .	1,228,680	950,075	99.2	40.9	98.6	39.8	98.6	34.2
Coorg .	766	800	100.0	100.0	94.7	51.1	95.8	59.9
Assam .	184,769	103,357	91.2	54.5	89.6	49.1	94.9	63.1
Burma .	440,715	259,962	95.2	34.4	94.8	29.3	95.7	33.2
Ajmer-Merwara	7,213		99.3		97.6		98.8	

### Vaccine Institutes and the Supply of Vaccine.

74. Glycerinated lymph, manufactured at provincial vaccine institutes, is now used throughout British India. Nijland's method is generally used in maintaining the potency of the seed lymph and the rates recorded in Table VI (ii) indicate clearly that this method continues to give successful results.





Nº 10

# VACCINATION GRAPH SHOWING PERCENTAGES OF SUCCESSFUL CASES TO TOTAL OPERATIONS DURING 1932-1933

Per 100 operations.



80

60

40

20

N.W.F.P.

Punjab.

Delhi.

U.P.

B. & O.

Bengal

P.

Bombay

Madras.

Coorg.-

Assam

Burma

## SECTION VI.

## VACCINATION AGAINST SMALLPOX.

## A.—British India.

73. *General*.—Because of the higher incidence of smallpox, vaccination operations in British India increased from 15,243,178 (9,553,815 primary and 5,689,363 revaccinations) in 1931-32 to 20,587,799 (10,002,875 primary and 10,584,924 revaccinations) in 1932-33. Every province except Madras recorded increases in primary vaccinations and all but the C. P. and Coorg had larger numbers of revaccinations. Of the 9,054,506 registered infants only 45% were successfully protected. 97% of the primary operations and 55% of the revaccinations were recorded as successes; details for each province are given in Table VI (*i*). The average number of vaccinations performed by each vaccinator was 2,774; but this varied between 14,446 in Delhi and 1,048 in Bihar and Orissa. Success rates for the different provinces are shown in the graph facing this page.

No cases of post-vaccinal encephalitis were recorded. As only a small percentage of the population can obtain skilled medical attention cases may pass unrecognised but on the other hand large numbers of the vaccinated infants are now inspected by health officials who have been instructed to keep a look-out for cases of this disease and, should any untoward incident or fatality follow a vaccination operation, it is probable that it would be brought to notice. In these circumstances, it is perhaps justifiable to assume that this disease has not so far occurred to any extent in India.

The average cost per successful operation was As. 4-0 as compared with As. 5-6 during 1931-32.

TABLE VI (*i*).

		Vaccinations.		Per cent. success.		Cost per successful case.		
		P.	R.	P.	R.	Rs.	A.	P.
British India .	{ 1931-32	9,553,815	5,689,363	97.0	57.9	0	5	6
	{ 1932-33	10,002,875	10,584,924	97.0	54.8	0	4	0
N. W. F. P. .	{ 1931-32	141,849	72,007	98.4	80.0	0	2	1
	{ 1932-33	177,115	129,618	98.5	80.2	0	1	7
Punjab .	{ 1931-32	903,217	815,766	98.4	67.5	0	4	4
	{ 1932-33	1,003,564	2,603,721	98.4	69.8	0	2	4
Delhi .	{ 1931-32	20,766	7,145	97.0	56.7	0	5	4
	{ 1932-33	34,275	155,608	95.4	44.4	0	1	11
U. P. .	{ 1931-32	1,389,267	107,657	96.3	46.9	0	4	4
	{ 1932-33	1,446,587	277,055	95.6	33.5	0	4	2
B. & O. .	{ 1931-32	1,059,540	147,088	99.7	58.7	0	2	3
	{ 1932-33	1,102,435	446,201	99.7	60.2	0	1	11

*Abbreviations—*

N. W. F. P. . . . North-West Frontier Province.  
 U. P. . . . . United Provinces of Agra and Oudh.  
 B. & O. . . . Bihar & Orissa.  
 C. P. . . . . Central Provinces & Berar.

P. . . . . Primary vaccinations.  
 R. . . . . Revaccinations.  
 P. M. . . . . Per mille.  
 M. O. H. . . . Medical Officer of Health.

No cases of infectious disease occurred among the 2,588 passengers on board the pilgrim ships which passed this port. All were medically examined but were not granted pratique.

As inspecting officer of the port under section 91 of the Indian Merchant Shipping Act, 1923, *vide* Government of India Notification No. 5-M II(4)/31, dated 26th September, 1931, the health officer inspected both medicine chests and provisions on 8 vessels ; on 6 and 8 ships respectively conditions were found to be unsatisfactory. The *ghee* supplied to ships crews in Aden is generally adulterated. The disinfection stove on Flint Island quarantine station was maintained.

June (111). 115,110 members of crews and 116,312 passengers were found protected by vaccination and 1,190 and 173,258 respectively were vaccinated on the wharf. 88 persons on riverine vessels, 340 on harbour vessels and 1,962 new crew members and light house keepers were also vaccinated. 46 vessels and the effects of 872 members of crews and 438 passengers were disinfected. Cases on board of infectious and other diseases totalled 1,085 with 10 deaths; these included suspicious illness 714; ordinary illness 256; chicken-pox 84; leprosy 16; smallpox 5; cholera, measles and mumps 3 each; and influenza 1. Four cases and 4 deaths were reported from riverine vessels and 19 cases and 3 deaths from vessels in harbour. The first group included 1 case of plague, 1 of smallpox and 2 of ordinary illness; the second included 10 of chicken-pox, 3 of cholera, 3 of smallpox, 2 of suspicious illness and 1 of mumps.

*Outward traffic.*—The effects of 37,705 Asiatic members of crews and 16,282 deck passengers on 564 vessels were disinfected and 11,196 European members of crews and 4,593 saloon passengers were inspected. 283 members of crews and 893 passengers were vaccinated. 3,677 baggage coolies were inspected and their clothes and uniforms were disinfected prior to their handling passengers' baggage. The temperature of 96 persons on board was tested of which 5 had a normal temperature. 47 cases of suspicious illness were allowed to embark on the commanders' responsibility; and of the 44 cases detained, 4 of chicken-pox and 2 of measles were treated in the contagious diseases hospital. Suspicious cases numbering 34 were kept under observation in the municipal observation and contagious diseases hospitals and 4 were allowed to go to their residences. Cases of fever and other ailments numbered 38. No case of human or rat plague occurred. Suitable measures for the prevention of the ingress of rats to vessels at wharves were practised. 24 vessels were fumigated by sulphur to comply with the measures in force at the port of destination and deratisation exemption certificates were issued to 10 vessels. Proposals for the more effective fumigation of vessels in ports were under consideration of Government. 283 members of crews and 893 passengers were vaccinated; and 274 persons on one vessel were inoculated against cholera. The provisions for the Asiatic crews on 92 ships were inspected and of 24 samples examined at the Harcourt Butler Institute of Public Health, Rangoon, 4 of *ghee* and 6 of rice were found adulterated.

The sanitary staff of the Port Commissioners' area included 1 sanitary inspector, 2 assistant sanitary inspectors and 1 sanitary sub-inspector; sanitation was maintained at a high standard.

### Port of Aden.

72. Lt.-Col. E. S. Phipson, I.M.S., was the P. H. O. from 1st January to 6th April and from 24th October to the end of the year; Lt.-Col. J. B. Hanafin, I.M.S., acted as P. H. O. in the intervening period. Bills of Health were granted to 1,555 ships and rigged vessels. 28 cases of infectious disease were reported on 19 vessels,—18 British and 1 French. Of these cases, 9 were smallpox, 12 chicken-pox, 5 measles and 2 pneumonia. Seven cases of smallpox, 1 of pneumonia and 5 of chicken-pox were landed; the others were isolated on board.

docks and the jetties; none of the 455 rats examined in the public health department laboratory was found to be infected with plague.

The quantity and quality of the municipal filtered water supplied to ships was satisfactory. 218 inspections of water boats were made by the port sanitary inspector. A few samples of *ghee* meant for the lascar crews were examined at the provincial public health laboratory and those found to be below standard were replaced by pure supplies.

At the request of the shipping agents, 171 deck passengers on 15 ships proceeding to the Straits were vaccinated at a fee of Re. 0-6-0 per head. Of the floating population of the port, 150 persons were vaccinated free of charge.

Ten incoming ships had cases of infectious disease on board and these were removed for treatment. No case of infectious disease was reported from the undecked native sea-going craft. Of 223 deaths reported by the police amongst the Asiatic floating population, 91 were due to accidental drowning, 47 to fever, 23 to injuries, 21 to diarrhoea, 17 to dysentery, 4 to poisons, and 1 to pneumonia; one person was murdered.

The admission rate from all causes among European seamen was 23 p.m. and the death rate was 0.2 p.m. Admissions for venereal diseases numbered 33; and 3 cases of drowning were recorded. No alien leper entered the country through this port and no cases of sleeping sickness were reported on vessels coming from East African ports.

Only one pilgrim ship, the S. S. "Rizwani" carrying 384 pilgrims, left for the Hedjaz. The usual sanitary arrangements were made for the embarkation of pilgrims for the Ganga Sagar *mela*.

Seven corpses and 690 carcasses were found floating or sunk within port limits.

### Port of Madras.

70. Incoming vessels numbered 671 carrying 61,408 members of crews and 89,977 passengers. 270 outgoing vessels carrying 29,448 members of crews and 12,369 passengers were inspected and granted Bills of Health. Eight cases of chicken-pox and 2 of measles were landed and treated in the Tondiarpet infectious diseases hospital. The disinfection of bedding and clothing of incoming and outgoing deck passengers and crews was carried out as usual. The disinfection shed was in charge of a sub-assistant surgeon and a nurse was employed for the inspection of female passengers.

No rat mortality occurred on any of the vessels that entered the harbour.

### Port of Rangoon.

71. Dr. J. A. Anklesaria, D.P.H., was the Port Health Officer. The port staff also includes an assistant P. H. O.

*Inward Traffic.*—116,300 members of crews and 289,570 passengers on 1,248 incoming vessels were medically inspected under the Burma Government, General Department, Notification No. 73, dated the 13th March, 1917 (Parts I-VII), and the Burma Vaccination Law Amendment Act IV of 1928. Of the 1,268 persons examined for fever, 1,095 were found to be sick, the numbers being high in November (161), October (134), September (120) and

permitted to continue the voyage, as complete isolation had been arranged for on board. The patient was bound for Bombay and the P. H. O. of that port was informed of the case by telegram. Eight deaths from non-notifiable diseases occurred on vessels at sea; causes of death were heart failure 4, septic tonsillitis 1, tuberculosis of the lungs 2 and chronic diarrhoea and general debility 1.

*Outward pilgrim traffic.*—Only 2 vessels carrying 1,758 pilgrims sailed for Jeddah and both were fumigated before the pilgrims were allowed to embark; 7 other vessels from Bombay called *en route* to Jeddah and 4,798 pilgrims were embarked from this port.

*Inward pilgrim traffic.*—Ten ships arrived and disembarked 8,852 pilgrims. 38 deaths from non-infectious diseases occurred on these vessels, chiefly due to general debility and the effects of hardships suffered during the Haj. 45 cases were in ships' hospitals on arrival.

Four vessels were granted deratisation and deratisation exemption certificates.

*Air-traffic.*—155 Bills of Health were granted to air-craft; 622 crew and 298 passengers leaving the port were medically inspected.

The air-line companies operating from and to Karachi were (i) the Imperial Airways Ltd., London and Karachi; (ii) the French Air Orient Company, Paris, Karachi and Saigon, and (iii) the K. L. M. Royal Dutch Air Mail Company, Amsterdam, Karachi and Java.

### Port of Calcutta.

69. Dr. J. B. McVail, M.R.C.S., L.R.C.P., was the Port Health Officer and other port staff included 4 assistant health officers, 1 medical inspectress, 1 sanitary inspector and 1 fumigation inspector. Owing to the abolition of one of the 4 posts of assistant P. H. Os., the routine inspection of all incoming ships was suspended and only ships reported to be "infected" or "suspected" were inspected.

Vessels entering totalled 1,193 and 1,191 vessels left the port. 18 inward and 1,225 outward-bound ships were inspected; 2,261 members of crews and 6,112 passengers on incoming vessels and 100,863 and 6,112 on outgoing vessels were passed during quarantine inspection, whilst 92 members of crews and 307 passengers on outward-bound vessels were not passed. Owing to the freedom of the town and port areas from plague, no routine disinfection of the clothing and bedding of Asiatic and African members of crews and of third class deck passengers of outgoing ships was carried out. 8,913 boats, lighters, etc., were inspected by the port sanitary inspector and 71 cases of sickness were reported. The clothing and bedding of crews and passengers were as usual steam sterilised at the disinfecting sheds in the Kidderpore Dock (2), King George's Dock (1) and Babu Ghat (1). 30 sea-going vessels, 12 inland steamers, flats and launches and 23 lighters, *bhars* and *dinghis* were disinfected and 56 sea-going vessels were fumigated with the Clayton apparatus. Deratisation of ships was commenced from March, 1932; and 48 deratisation certificates and 27 deratisation exemption certificates were issued. A total of 10,168 rats was killed by the Port Commissioners' staff within the

234 members of the crews and 125 passengers of departing vessels were detained for diagnosis and of these 5 and 30 cases either because of infectious disease or for other reasons were not allowed to embark.

No attempt was made to maintain records of the vaccinal state of all persons embarking *ex-Bombay* or in ships calling at this port as these would have been vitiated by the fact that through-passengers in passing ships working in quarantine are not always inspected by the officers of the port health staff. It is certain, however, that all passengers leaving Bombay by B. I. S. N. Company ships for African ports and by pilgrim ships for the Hedjaz were recently vaccinated prior to embarkation. The vaccinal state of other persons and in other lines is indicated by the following instances :—

- (i) 2,427 members of various crews were found to be unprotected against smallpox because (a) they had never been vaccinated, or (b) they had not been vaccinated since infancy, or (c) they had not been vaccinated within the past 5 years ;
- (ii) during the last six months of the year, of 4,902 local passengers embarking on P. & O. S. N. Company ships *ex-India*, 497 were found to be unprotected or insufficiently protected ; and of 3,448 through-passengers landing temporarily from ships making a passing call, 960 were found to be similarly unprotected. These figures make a total of 1,457 unprotected persons amongst 8,350 passengers and unprotected percentages of 10·14 amongst local passengers and 27·84 amongst through-passengers.

The sanitary state of the harbour and the various *bunders* and docks was generally satisfactory throughout the year.

### Port of Karachi.

68. Dr. B. F. Khambata, D.P.H., was the Port Health Officer.

*General.*—The port and city of Karachi were completely free from plague and cholera throughout the year and no epidemic of a serious nature occurred on any incoming vessel. The sanitary condition of the harbour was generally satisfactory.

Bills of Health were granted to 48 incoming vessels, including 10 pilgrim ships and 2 country crafts, and 748 outgoing vessels, including 307 steamers and 441 country crafts. These had on board a total of 65,305 passengers and crews of which 14,941 were on incoming and 46,364 on outgoing vessels.

No cases of plague, cholera, mumps, beri-beri, jigger, sleeping sickness, cerebro-spinal meningitis or influenza were recorded. Two cases of smallpox were detected during the medical inspection of deck passengers at the port health disinfection station and were detained. Six cases of chickenpox were landed from 4 vessels ; 5 were treated in the epidemic diseases hospital and 1 child, who had arrived from Bombay *en route* to the Persian Gulf, was detained along with his parents. Other diseases reported included 2 fatal cases of pneumonia, of which 1 occurred on board between Busrah and Karachi ; 1 of scarlet fever ; and 22 of measles, including 17 among troops and their families on S. S. "Somersetshire" which were taken over on arrival by the military medical authorities. The scarlet fever case was



TABLE V (iii)—*contd.*

	No. of ships.	Rats on board.				Certificates issued.			
		Killed by trapping.	Killed by fumigation.	Examined.	Found infected.	Disinfection.		Exemption.	
						Loaded.	Un-loaded.	Loaded.	Un-loaded.
Total	28	107	506	375	..	2	28	7	16
January	2	..	42	42	..	..	3	..	..
February	4	16	14	30	..	1	3	..	3
March	..	..	..	..	..	..	6	..	3
April	2	1	11	12	..	..	1	1	..
May	2	2	92	92	..	..	2	1	..
June	5	38	205	126	..	1	4	..	3
July	1	5	58	5	..	..	1	..	..
August	1	1	18	18	..	..	1	2	..
September	1	2	..	..	..	..	..	1	1
October	1	4	14	14	..	..	1	2	..
November	5	19	11	17	..	..	2	..	5
December	4	19	41	19	..	..	4	..	1

*Outward pilgrim traffic.*—Before pilgrims were allowed to embark, all pilgrim ships were thoroughly cleansed and freed from rats by the Clayton process. Medical inspection and disinfection of clothing and bedding of pilgrims likely to have been exposed to infection were also carried out before embarkation. 5,816 pilgrims in 10 vessels sailed for Jeddah between the 14th January and 1st December. Before embarkation 4,536 pilgrims were vaccinated by a special staff and 4,881 were inoculated against cholera.

*Inward pilgrim traffic.*—4,231 pilgrims in 10 vessels arrived from Jeddah between the 6th May and 17th November; 38 deaths occurred during the voyages and 13 cases of infectious diseases were found on board on arrival.

Under Government of India, Department of Commerce, No. 5/W-11(4)/31, dated the 26th September, 1931, the duty of inspection of lascars' provisions on board ship was transferred from the shipping masters to the port health department. 362 inspections in this connection were made and Table V (iv) gives details of the samples taken.

TABLE V (iv).

	Samples taken.	Passed by Chemical Analyser.	Condemned by Chemical Analyser, and replaced.
Rice	3	2	1
Flour	1	..	1
Dhal	1	..	1
Ghee	196	102	94
Salt	1	1	..
Butter	1	1	..
Coriander	2	1	1
Fish	1	..	1
Tea	6	5	1
Condensed Milk	13	12	1
Lime Juice	11	..	11
Caraway	2	..	2
Turmeric	2	..	2

Nine vessels arrived with cases of chicken-pox, measles, mumps and scarlet fever among their crews or passengers and departed within 12 days of their arrival; of these 6 were through vessels. The Bills of Health granted in those cases were endorsed to show the diseases which had occurred on board and the preventive measures taken.

Medical inspection and disinfection of all "infected" or "suspected" vessels were carried out; all pilgrim ships were inspected on arrival.

*Incoming vessels.*—Inspections were made of 116 incoming vessels with crews aggregating 14,374 persons and 14,849 passengers and pilgrims. Including hired transports, 23 of these ships had cases of infectious disease on board either at the time of arrival or during the voyage. These cases included influenza 33; measles 32; chicken-pox 27; smallpox 7; mumps 5; and jigger, acute pneumonia and scarlatina 2 each. Cases which occurred in hired transports were, on landing, dealt with by the military authorities; all others were dealt with by the port health staff.

Four cases of influenza, 3 of chicken-pox, 1 each of smallpox, measles and jigger occurred on vessels lying in the harbour or docks. The clothing and bedding of the 124 members of the crews of these vessels were disinfected.

*Disinfection.*—Seven vessels were disinfected on account of infectious diseases. Under article 28 of the I. S. C., 43 deratisation and deratisation exemption certificates were issued; 20 ships were deratised by sulphur fumigation and 23 were inspected for exemption certificates. In addition, 10 pilgrim ships were fumigated under Government of India Notifications No. 1606, dated 13th July, 1908. The disinfection station dealt with 283 bundles of clothing and bedding.

Table V(iii) summarises the anti-rat operations carried out in compliance with Article 28 of the I. S. C. together with those conducted in the city by the municipality. No deaths due to mephitic gas poisoning occurred during the cleansing of ship bilges but 256 accidents with 4 deaths occurred on board vessels in the harbour or docks.

TABLE V(iii).

	Killed.		Examined.		Ships deratised by Fumigation and trapping.	
	Town.	Docks.	Town.	Docks.		
Total	656,465	7,005	272,530	7,095	600	29
January	62,482	535	26,754	535	50	
February	60,244	390	27,104	399	96	
March	59,455	468	23,882	468	129	
April	60,372	574	26,304	574	146	
May	46,053	530	16,453	530	59	
June	45,122	458	16,261	458	39	
July	46,781	802	19,060	802	27	
August	54,920	708	22,904	708	29	
September	50,862	651	21,207	651	38	
October	58,209		22,482	638	34	
November	53,884	561	24,464	561	21	
December	58,101	771	25,595	771	22	

*III.—Rats killed on board*

Ports.	Ships.	Rats killed by		Rats.	
		fumigation.	trapping.	Examined.	Found infected.
Bassein .	..				
Bombay .	28	506	107	375	
Calcutta .	not given.		327	22	
Chittagong					
Cochin .					
Karachi .		79			
Madras .					
Moulmein					
Rangoon	*1,494	60	1,112	1,172	

\* Includes 839 partly loaded ocean-going steamers ; 620 empty cargo lighters ; 16 loaded and 19 empty vessels.

*IV.—Deratisation of Ships.*

Ports.	Deratisation		REMARKS.
	certificates.	Deratisation exemption certificates.	
Bassein . . . . .	..	..	
Bombay . . . . .	30*	23	* 2 loaded & 28 unloaded. Deratised after discharge of cargo.
Calcutta . . . . .	48	27	
Chittagong . . . . .	..	..	
Cochin . . . . .	..	..	
Karachi . . . . .	1	3	
Madras . . . . .	..	..	
Moulmein . . . . .	..	..	
Rangoon . . . . .	24	11	

**Port of Bombay.**

67. Major C. L. Bilderbeck, I.M.S., was the Port Health Officer.

892 vessels of all classes, carrying 146,465 persons (crews and passengers), were examined and the clothing, bedding and other belongings of 43,539 persons were disinfected. In addition, 12,989 coolies and other were inspected to enable certain vessels to work cargo.

*Outgoing vessels.*—770 vessels with 107,118 persons (62,651 crew and 44,467 passengers) were inspected. These figures are exclusive of troops who were examined by the military embarkation staff. In accordance with Government Notification, General Department No. 1713, dated the 15th March, 1917, medical examination was conducted of (a) 28,563 Asiatic and African members of crews, (b) 8,936 third class passengers not provided with cabin accommodation and fourth class and deck passengers and (c) 5,816 pilgrims leaving for ports beyond India.

## Major Ports.

65. For the large sea-port towns in India mortality figures are given in Table V(i) under 12 different headings.

	Bombay.		Calcutta.		Madras.		Rangoon.		Karachi.	
			Deaths. Rate p. m.		Deaths. Rate p. m.					
Total	22,356	19.7	30,011	25.1	22,290	33.6	9,875	24.7	7,340	26.4
Small-pox	313	0.2	685	0.6	176	0.3	493	1.2	47	0.2
Cholera	7		1,212	1.0	5		3			
Plague	37				*1		27	0.1		
Enteric fever	185	0.2	884	0.7	101	0.2	85	0.2	55	0.2
Malaria	76		882	0.7	165	0.3	122	0.3	22	0.1
Kala-azar.			241	0.2	31					
Relapsing fever	1									
Influenza	76	0.1	537	0.4					1	
Measles	100	0.1	189	0.1	16	..			241	1.0
Dysentery	301	0.2	1,490	1.2	1,327	2.0		0.6	129	0.5
Tuberculosis	1,389	1.2	2,280	1.9	917	1.4	792	2.0	475	1.9
All other causes	20,371	17.7	21,631	18.3	19,542	29.4	8,106	20.3	6,370	22.5

\* Imported case.

66. Table V(ii) gives particulars of (a) rats killed in ports and on board ships, (b) deratisation of ships and (c) deratisation certificates.

TABLE V(ii).

## I.—Rats killed and examined in Ports.

Ports.	Killed.	Examined.	With plague.	REMARKS.
Bassein	2,034	1,341		
Bombay *	663,560	279,625	691	{ * Figures for both town and docks.
Calcutta	10,168	433		
Chittagong	..	168		
Cochin	..	..		
Karachi	2,537	201		
Madras	..	..		
Moulmein (town)	5,532	294		
Rangoon	9,612	1,796		

## II.—Number of ships deratised.

Ports.	Ships deratised.	Method of fumigation.	REMARKS.
Bassein			
Bombay	30	1 Sulphur; and 29 sulphur and trapping.	506 rats were killed on deratised ships.
Calcutta	48	Sulphur (Clayton).	
Chittagong			
Cochin			
Karachi		Sulphur (Clayton)	
Madras			
Moulmein			
Rangoon	24	Sulphur (Clayton)	60 rats were killed on deratised ships.

complete arrangements made by the Public Health Department of the Union and for the carrying out of the secretarial and clerical duties.

On almost every one of the subjects dealt with, notably in the case of yellow fever and plague, further information or new developments calling for action by public health authorities, and having international importance, are likely to need attention in the near future. For this reason, and since the experience afforded of the advantages of personal discussion between responsible officials of neighbouring territories in Africa has been so strikingly shown by the present conference, the delegates considered it desirable that a similar conference should be convened after an appropriate interval, and that the League of Nations should be invited to take steps, not later than 1935, to ascertain the wishes of administrations concerned in this matter.

Major General Graham in his final comments expressed the opinion that, in future, incidents which might arise in connection with port health work, between India and East Africa and more especially Zanzibar, Dar-es-Salaam-Portuguese East and the Union (Natal, Durban) and which required an exchange of view would be able to be settled directly by technical correspondence without recourse to correspondence through governmental and diplomatic channels as had been the case previously. He considered that the conference had been justified by its results; it had been run cheaply so far as the League of Nations was concerned and it was, in his opinion, likely to be repeated in three or four years time if not earlier, in view of its yellow fever pronouncements and the desirability of their continuance.

#### **Kamaran Quarantine Station, Red Sea.**

64. The civil and general administration of the island of Kamaran is under the Government of Bombay but the medical administration of the quarantine station is under joint Anglo-Dutch control. The pilgrimage of 1931-32, which lasted for just over 5 months, opened with the arrival of the S. S. "Kotatjandi" from the Dutch East Indies on the 5th November, 1931, and closed with the departure of the S. S. 'Alavi' to India on the 9th April, 1932. 33 steamers, with 17,740 pilgrims, passed through Kamaran and were dealt with in accordance with the measures prescribed for "healthy" ships under the Anglo-Dutch Agreement of 1926. No "infected" or "suspected" steamers were dealt with, as the general health of the pilgrims was very good; only 1 case of chicken-pox was reported on a ship coming from British India. Only 15 deaths were recorded on pilgrim ships travelling between ports of embarkation and Kamaran, as compared with 37 in the previous year, the percentage of mortality being 0.09. Of the total, 5 deaths occurred on steamers from British India, 9 on those coming from the Dutch East Indies and 1 on an Arabian vessel. One birth occurred on a ship from the Dutch East Indies. 31 steamers,—14 Dutch and 17 British,—with 17,259 pilgrims protected against cholera and smallpox, were granted exemption from landing; 481 pilgrims on 2 other steamers were landed for disinfection, etc.

Any form of propaganda, especially amongst natives, and any measures which will encourage natives to report early cases of leprosy, should be encouraged to the utmost.

Apart altogether from the question of discharge from leper institutions of arrested cases of the disease, members are in agreement that the cases or types of leprosy which may be regarded as 'closed' and which, while still showing clinical evidence of active leprosy are nevertheless free from bacilli, should not be compulsorily detained in any leper institution.

*Manila report.*—Members are in agreement generally with the views expressed in the conclusions of the report. All are agreed as to the desirability for uniformity of methods and terms in such matters as the designation of cases, lesions and nomenclature.

With regard to the classification suggested in the report, members were informed that there are certain sub-types of leprosy in South Africa which do not fit in with the proposed classification. The matter is, therefore, still under consideration by the Union Government. The other members are prepared to accept the classification referred to.

*Medical treatment of leprosy.*—In practically all areas some form of chaulmoogra oil treatment is in use. Iodised ethyl esters are being tried out in several of the areas, and in two of them, namely, in the Union and Nigeria, this preparation is being successfully manufactured in the manner prescribed in the Manila report.

*Evaluation of terms.*—While the majority of members are in agreement with the definitions of 'active cases,' 'quiescent cases', and 'arrested cases', the South African delegate holds the view that the definition of an 'arrested case' should receive further consideration in the light of South African experience, which goes to show that in many cases the period can be reduced to one year, provided the bacteriological examination over the yearly period is carried out monthly.

All members are agreed as to the necessity of abstaining from making use of the word 'cure' as applied to leprosy.

*Conclusion.*—At the outset it was stated that anti-leprotic activities and measures in operation in different African States varied considerably. The reasons for this are to be found in the fact that apart from the incidence of disease and other factors, the public health problems and the magnitude of such problems, particularly in Africa, vary very widely, and Health Administrations dealing with such matters as yellow fever, plague, malaria, yaws, syphilis, sleeping sickness and tuberculosis, can only assign such energies and expenditure to leprosy as the disease warrants in view of its relative importance to other problems with which they are faced.

The recommendations contained in these reports can, therefore, only be applied to any of the African States to an extent which the public health, local needs, conditions, machinery and financial resources pertaining to the country concerned justify.

*Rural hygiene.*—This question was dealt with by the sub-committee of which Major General Graham was chairman. The sub-committee's report dealt with general considerations affecting the African countries and more especially with the preventive and curative functions of the field personnel, the co-operation between government departments, the economic status of a community in its bearing on public health, education in hygiene, native and European staffs and missionary activities.

*Dengue.*—This question was also dealt with by a sub-committee whose report was adopted by the plenary conference on the last day. It dealt mainly with the acceptance, by the African Colonies and Union, of the convention for combating dengue fever as adopted by the Office International.

The last meeting of the plenary conference was held on the 25th November when various resolutions were adopted. The conference expressed its grateful appreciation of the facilities placed at its disposal as well as the consideration which the delegates had received from the Mayor and Town Council of the city of Cape Town, the chairman and members of the Divisional Council of the Cape, the University of Cape Town, the South African Medical Association and other hosts. The conference also expressed its gratitude for the

*Smallpox.*—The terms of reference were “the adoption of uniform regulations for the prevention of the introduction into southern and eastern Africa of smallpox from India.” Major-General Graham opened the proceedings of the sub-committee by making a statement which summarised the history of the question at issue and brought the position up to date of the conference, whilst also touching upon the rôle played by the Office International in the matter.

Full discussion eventually secured unanimity on the question of what would secure protection of an individual from smallpox, *viz.*, vaccination effectively performed not less than 12 days, not more than three years previously, or a previous attack of the disease. It then remained for the authorities at the port of embarkation to evolve such administrative procedure as would secure that emigrants should be in a protected state before embarking, which would afford security both to the ship in which they travelled and to the country of destination.

The committee agreed that it was desirable to prevent persons who may be infected with smallpox from embarking on ships. The East and South African Governments are concerned to allow only the immigration of persons who are protected from smallpox. The final decision as to the protection enjoyed by an individual rests with the Port Health Officer at the port of disembarkation, but reliable certificates may assist him in deciding individual cases; he will exercise his discretion also in the case of infants born during the voyage, and in other exceptional circumstances. The validity of the certificates not issued by the health authorities should be officially attested before embarkation, if they are to be of value to the health authority at the port of disembarkation.

It was agreed between Major General Graham and Sir Edward Thornton that the first move in correspondence in regard to the position as now agreed on would be made by the Medical Department of the Union Government who would report the findings of the conference to the Union Government for further necessary action with India and the East African countries.

*Leprosy.*—The question of leprosy was considered by a sub-committee whose report was presented to and adopted by the plenary conference on the last day. The following paragraphs give a summary of the report:—

*General.*—At the request of the chairman, each member briefly outlined the leprosy problem in the region which he represented.

From the ensuing discussion, it was clear that the leprosy policy problem and practice in the various regions of Africa varied within very wide limits.

*Bangkok report.*—After discussion, the summary and conclusions contained in this report were found to be acceptable to all members.

*Isolation of cases.*—Members, while accepting the view that isolation of infectious cases is one of the necessary measures in prophylaxis of the disease, are of opinion that a comprehensive system of effective isolation of all infectious cases is, in certain of the large regions of Africa, not at present a practicable proposition.

Members desire to emphasise that any system of compulsory isolation of cases of leprosy must be imposed with discretion, bearing in mind not only the public health and social interests of the community at large, but also the effect of such measures on the native mind and the danger of undue rigidity causing natives to hide cases which may be highly infectious.

rodent-free belts. The problem is chiefly rural, and attacks on veldt rodents by means of trapping, gassing and poisoning are the principal anti-plague measures.

In East African countries local conditions are often unfavourable to an efficient anti-wild rodent campaign, even if such were necessary. Where the multi-mammate mice and other similar rodents play an important part, as seems the case in certain areas, an anti-wild rodent campaign would have to be undertaken; generally speaking however in East African countries anti-plague measures can be directed principally against domestic rodents.

In East Africa it would appear that the presence of *Rattus rattus* militates against the invasion of building by multimammate mice and similar rodent species, which were formerly domestic rodents in these countries.

(ii) A primary requirement, from the international point of view, is the sending, at suitable intervals, of information to the Office International d'Hygiene Publique regarding new evidence obtained about the extension of rodent plague and the measures taken to deal with it; in this way a record is available to the health administrations of all countries interested. Examples have been brought to the notice of the conference of co-operation having taken place between countries infected with plague and others which have been threatened with the possibility of outbreaks. There can be no doubt that great benefit has resulted from this co-operation which has taken various forms; in one instance a conference was arranged to decide upon mutual action by the representatives of the Health Department of the Union and officers from South West Africa and Angola; in a second instance a rodent survey of a portion of Bechuanaland Protectorate was carried out by the Union Health Department acting at the request of the Bechuanaland Government. The great importance of co-operation was realised and it was thought that even more could be effected in the future by local agreement between neighbouring countries and by following up notifications of epizootics or first cases of plague by communications outlining the course of the spread of epizootics or epidemics from time to time. Some anxiety was expressed as to whether the epidemic in South West Africa was under proper control, and it was thought that, if a rainy season occurred, it might be necessary for the administration responsible materially to strengthen the staff to enable the outbreak to be efficiently handled.

(iii) Much has yet to be learned regarding the protective efficacy of anti-plague vaccination in different circumstances and the degree of importance which should be assigned to this method of protection among those available for preventing the extension of human plague. The conference noted that special enquiries on this subject are not in progress at the Office International d'Hygiene Publique, in which it is evidently desirable that African health administrations should fully participate. At the moment it was only possible to note the principal facts contributed by the delegates present in regard to the employment of vaccination in their territories.

In British India, as is well known, anti-plague vaccination (Haffkine) is practised on a large scale as one of the routine precautionary measures, and is reported, on the basis of large experience, to be attended with considerable success. A vaccine prepared locally according to the Haffkine method is employed in South and East Africa. Vaccination of the mass of the population against plague is not now attempted either in Kenya or Uganda; but vaccination is, however, still used on a considerable scale for contacts in infected areas in Kenya, as also in Uganda and Tanganyika though to a less extent.

In Angola, the vaccine employed is obtained from the Pasteur Institute in Paris, and has been utilised on a large scale for prophylactic work when plague occurs. Little use is made of anti-plague vaccination in the Union of South Africa.

In general, vaccine is made available to and employed for the close contacts of infection, e.g., those engaged in anti-plague work.

(iv) Disinfestation and disinfection of shipping was discussed and the attention of the conference was drawn to the standards in respect of HCN and SO<sub>2</sub> agreed upon by the fumigation commission of the Health Committee of the League of Nations.

..... practical application .....  
similar methods of plague control, as well as in all aspects of plague research, it is important that African administrations should take as active a part as circumstances and opportunities permit, in order to add to our technical and scientific knowledge.

The economic aspects of rat destruction as distinct from disease dissemination must not be lost sight of in view of the extensive damage to property and food stuffs for which rodents are responsible.



which is now being undertaken by the Rockefeller Foundation. Such work would include the performance of protection tests and of protective vaccination.

6. For the purposes of paragraphs (4) and (5) above, the importation of fixed mouse-brain yellow fever virus should be permitted in laboratories in Africa under Government authority and control.

7. The co-operation of the Rockefeller Foundation in the establishment of laboratories for yellow fever control advocated in paragraphs (4), (5) and (6) above, in the manner suggested by Dr. Sawyer, is particularly welcome.

8. The action taken by the British Government in providing facilities in England for protective vaccination against yellow fever deserves attention, and it is hoped that other administrations concerned with public health work in Africa will provide similar facilities, at those laboratories where yellow fever work is being carried out or is being projected.

9. The risk that infection with yellow fever from west to east may spread from village to village by the opening up of new trade and motor routes should be taken into account. It is hoped that the present position along such routes may be determined by protection test surveys of the population, and that the position thereafter may be reviewed from time to time by re-surveys. This slow method of spread of the disease may ultimately prove more capable of breaking down our defences than the more rapid spread which can result directly from modern fast means of transport. In this connection it is suggested that the excellent motor routes which now exist from the French Cameroons across French Equatorial Africa and the northern section of the Belgian Congo, need to be considered in connection with risk of infection to the Anglo-Egyptian Sudan and to Uganda.

10. Although the possibility exists of transport of infected mosquitoes by air, rail or road, it is considered that the greatest risk, or at least the more difficult risk to avoid, consists of the transport of a person during the incubation period of the disease.

11. It is agreed that the Governments of African countries should be advised forthwith to accept and ratify the International Sanitary Convention, 1932, for Aerial Navigation.

12. The systematic communication of new facts in regard to yellow fever in Africa to the Office International d'Hygiène Publique in Paris, for consideration by its Yellow Fever commission, is provided for by the above convention and this system should be utilised as fully as possible.

13. Yellow fever control, as now carried out in the West African colonies, is an important factor for the protection of neighbouring colonies from yellow fever infection, and it is important that these measures should be continued and this efficiency augmented. Special stress is laid upon the provision of pipe-borne water supplies, active destruction of *Aedes* in towns and villages, and the segregation of non-indigenous populations in residential areas in which effective *Aedes* control can be maintained.

14. The Health Departments of African countries believed at present to be free from yellow fever infection should obtain more information concerning the *Aedes* infestation than is now available, and should introduce or take effective measures for the control of *Aedes* (including larvae) in those centres at which risk of introduction of yellow fever infection is specially to be apprehended.

*Plague.*—The question of plague was considered in the plenary session on four days and a demonstration of cyanide fumigation of rodents was given in the field one afternoon. The discussion was confined to South African plague, and the remarks which Major-General Graham made on certain aspects of experience with Indian plague were made at the request of the chairman at the end of the discussion and by way of giving additional information and a new view-point. All the African delegates made statements giving their experiences. The conclusions of this report are also appended *in extenso* :—

(i) In South Africa the dissemination of plague depends principally on infection of wild rodents, in other parts of Africa the domestic rodents play the determining role.

In South Africa there is little danger of urban outbreaks of plague inasmuch as towns are protected by the building out of rodents, by anti-rat measures and in some instances, by

fever, (i) evidence of absence of infection with yellow fever in east and central Africa, (j) possibility of *Aedes aegypti* travelling by aeroplanes or motors, (k) possible routes by which infection may spread from infected to non-infected countries, (l) plans for extension of protection test surveys, (m) laboratories in Africa capable of undertaking yellow fever investigation, (n) function of laboratories undertaking yellow fever investigation, (o) importation of yellow fever virus into non-infected countries and (p) protective vaccination against yellow fever; (3) principles of the International Sanitary Convention for Aerial Navigation, 1932; (4) existing and projected air routes; (5) measures applied or proposed for the control of yellow fever and the *Aedes* vector: (a) by governments of countries in which yellow fever is endemic and (b) by governments of countries which are infectable with yellow fever; (6) statement of delegate representing the Government of India and (7) general principles upon which delegates were in agreement.

*Papers read or laid on table included:—*(a) Translation of the report made by the yellow fever commission to the Permanent Committee on recent knowledge of yellow fever (Office International d'Hygiene Publique), (b) the present knowledge of yellow fever as it relates to the problem in Africa by Dr. W. A. Sawyer, Associate Director of the International Health Division, Rockefeller Foundation, (c) latest information in regard to air routes received through the Director of Air Services, Union of South Africa, (d) English text of the International Sanitary Convention for Aerial Navigation, 1932, (e) note by Sir George Buchanan regarding discussion on the aerial sanitary convention, (f) note on yellow fever control in the Gold Coast and the present situation by Dr. Duff, Director of Medical and Sanitary Service, Gold Coast, (g) note on yellow fever in Angola by Dr. Damas Mora and (h) note by Dr. Scott of Dar-es-Salaam.

The conclusions printed at the end of the report are so important that no apology is needed for reproducing them *in extenso*.

1. None of the fundamental observations upon which public health control of yellow fever is based have been disturbed by recent knowledge. Although under exceptional conditions the incubation period in man may be protracted or the infectivity period may be prolonged, and although experimentally a wider range of dispersal of the mosquito vector has been shown to be possible, yet for practical purposes public health control of yellow fever can be based upon the observations that yellow fever is transmitted from actual human cases only in the first three days of the attack, that the incubation period of new cases does not exceed six days, that the agent of transmission is a domestic mosquito which remains in, or in the immediate vicinity of, the house where it has fed, and that the insect after feeding upon an infected case must survive for twelve days before it can transmit the virus to another person.

2. The mouse-brain virus protection test may be accepted as specific for yellow fever.

3. Large areas in Central, Eastern and Southern Africa, believed at present to be free from yellow fever infection, must be regarded as infectable.

4. It is of obvious importance that immediate action be taken to ascertain the position with respect to the presence of the disease, unsuspected, in endemic form, and also to the susceptibility of the population to the disease, in those African countries in which yellow fever has so far been unknown. In these enquiries the Government of the Anglo-Egyptian Sudan, not represented at this Conference, should be invited to participate. It is satisfactory to record that action recommended in this section is already envisaged in French Equatorial Africa, as well as in Angola; that protection test surveys have already been commenced in the Belgian Congo, and that arrangements are now in progress for similar surveys to be carried out in Union of South Africa and Bechuanaland Protectorate, South-West Africa, Mozambique, Southern Rhodesia, Northern Rhodesia, Tanganyika, Kenya, Uganda and Zanzibar.

5. Steps should be taken for the provision of equipment and for the training of staff at appropriately selected and placed laboratories in Africa, where necessary work on yellow fever can be carried out after the termination of the detailed work covering many parts of Africa.

Later on Dr. Sawyer outlined the future work of the Rockefeller Foundation regarding work on yellow fever and added that the consensus of opinion was that the investigation should be pushed to enable countries like East Africa and India to have more accurate ideas regarding the distance of infection and any changes in this. He stressed also Major-General Graham's argument regarding the weak links in the chain. While the Lagos laboratory would continue its present work for a year or more in view of the interest of the Office International and the League of Nations, the second phase should be carried out by the various governments taking over and controlling whatever work was needed and as seemed to them wise. Other urgent questions to be considered were :—

- (a) As serum testing of convalescents in Africa would be very helpful, laboratories for this were essential.
- (b) A yellow fever board was needed.
- (c) Vaccination of personnel not going to Europe was necessary.
- (d) Laboratories for research and investigation were necessary.
- (e) Dangers have been greatly reduced, though *not* eliminated, by
  - (i) introduction of attenuated virus which cannot produce yellow fever and
  - (ii) immunisation of the staff.

“ During this transition period the Rockefeller Foundation would be willing to help by giving any laboratory men facilities to learn technique or by sending a Rockefeller man to the laboratory in question. The brain test being expensive is difficult to run, and, in survey work, the collection of blood by the ordinary medical officer is unsatisfactory and a trained medical officer is needed. The Western African countries would be under Dr. Beeuwkes' laboratory at Lagos and other Government laboratories. The Eastern African countries should begin at once a rapid superficial survey on lines which he could discuss and arrange at Cape Town now with all Administrative Medical Officers of East African Colonies as the principal work of the immediate future will aim to give an idea of what has recently been done with regard to yellow fever in the aforementioned zone across Africa.”

The final report on yellow fever was presented to the plenary conference on 24th November and adopted. It is a most valuable contribution and, as Major-General Graham states, it should be studied in detail by all interested in the question. This report, representing as it does expert views on the most important subject before the conference, should be of the greatest assistance to the Government of India in enabling it to decide on its future policy for yellow fever prevention and control.

Part I of the report includes the following sections : (1) distribution of yellow fever in Africa, (2) air traffic and carriage of yellow fever infection, (3) control over yellow fever in West African Colonies, (4) prospect of additional safeguards by vaccination and (5) importation of yellow fever virus. Part II includes : (1) papers read or laid on the table, (2) summary of facts elicited concerning epidemiology and the delimitation of endemic areas : (a) recent studies by means of protection tests, (b) specificity of protection test, (c) virus reservoirs and carrier cases, (d) non-virulent strains of virus, (e) racial resistance or immunity, (f) risk of infection with yellow fever in endemic and in non-endemic areas, (g) effect of introduction of non-immunes into district, (h) infectibility of eastern and southern Africa and of the east with yellow

Following Dr. Duff's paper the health representatives of northern Rhodesia, Angola (Portuguese West), Mozambique (Portuguese East), Kenya, Uganda, Bechuanaland Protectorate, Basutoland, Zanzibar, South Rhodesia, South-West Africa, Tanganyika, Natal, Zululand and the Union of South Africa made statements in regard to the measures their respective countries were taking or had taken in regard to the provision of sanitary aerodromes and measures in relation to stegomyia control. Thereafter Major-General Graham made the following statement in regard to India's point of view :

" The point of view of India is not quite parallel to that of other countries whose representatives we have heard. When the Panama Canal was nearing completion, the then Director-General of my service had thought very carefully of all this. We have on record at that period—about 1912-13—a survey of our major ports which was made. The conditions have not altered materially to-day from what was found at that particular time. We are a stegomyia-ridden population. The minor ports are just as badly affected as the major ports. Major James who did this survey continued his work in Colombo and then went to Panama. After the outbreak of the great war everything more or less was upset; and, in the meantime, the practical experience was arrived at that, in spite of the Panama canal having opened, nothing happened, so we more or less lulled ourselves into a sense of security; after the war the matter received a new stimulus by development of this air traffic. Imperial Airways projected a route to Karachi; and the French followed up with the route through Burma to Indo-China and the Dutch with a route to Batavia. At this time this particular Convention you have before you was drafted. India has been considering this Convention from time to time through her delegation to the Office International. Incidentally, in addition to that, as you have heard she also considered the question of the importation of the virus. That was raised originally at Singapore and the Far Eastern Association of Tropical Medicine Congress in Bangkok. The matter then came before the Health Committee of the League and the 'Office' in Paris. It was also considered in Europe: you have heard with what results, *i.e.*, that various countries have prohibited it in various ways. I wish to take up one particular article of the draft convention because I have been requested to put my Government's views before this conference. Article 48 was rather a stumbling block with India in the first draft. My Government considered that the article did not give sufficient power to non-affected countries; and, as the result of discussions at the 'Office' meeting in Paris in May 1931, a clause was inserted very largely at the instance of India and in order more or less to satisfy the position of India. The representative of India was asked to bring this again before the Yellow Fever Committee of the 'Office'; and you will find an account of the discussion in the *procès-verbaux* of the April-May session, 1932. The official interpretation of Article 48, I may say, went very far towards satisfying the Government of India; but, as you know, there have been various discussions since. I would remind you that we have a population in India of 351 millions and of that number 80 millions are living in Native States; so you must realise what a terrible thing it would be if, even though the disease were confined to the ports and the immediate hinterland, it arrived in a country like India. Some of the points which were troubling us have been pretty well disposed of at this Conference and I shall have great pleasure in telling my Government exactly what has happened here.

India's position prior to this Conference was that, while anxious in every way to avoid any interference with the completion and ratification of the international sanitary convention as you have it before you, they more or less felt that, in the light of available information, India should meanwhile adhere to the view that the prohibition of air traffic from yellow fever areas to susceptible areas is the only reliable safeguard. Now we have had this Conference. I have had the privilege during the voyage to Cape Town of talking about it to Sir George, Dr. Sawyer and also Dr. Duff. Since coming here I have heard Dr. Johnson; and, having read his paper to the British Medical Association in July, 1932, I have gained a lot of information. Then I have had information from Dr. Orenstein and from all the various officers who have spoken on the position in regard to the non-affected African countries. The statements based on the practical experience of the disease behind all this have been to me invaluable.

We now come to what is going to be the position in regard to the future so far as my Government is concerned. As I have said my Government is not in any way against the inauguration of the convention. It attaches the greatest importance to securing some form of joint action on the part of the threatened countries of Africa. Risks to India would be greatly increased if the disease should spread to the East African countries: it is obvious that co-operation of effort is therefore very essential. If we have a chain with a series of links and one link gives way the chain breaks. You can therefore understand the anxiety with which India is looking at this question. It will give me great pleasure to place the results of this conference before my Government when I return in order to assist them in the consideration of the problem and in their future line of attack towards it."

and dengue were constituted, of which Major-General Graham was a member of the first three and was chairman of those on leprosy and rural hygiene. It was decided that the sub-committees should not report individual views in their discussions but should present a report to the plenary conference, that periodical statements should be prepared for the press, that yellow fever should be considered first in the plenary conference, followed by other diseases likely to be carried by aircraft and by the reports of the sub-committees.

The plenary conference discussed the question of yellow fever on four separate days. In the first place prepared statements on the transmission of yellow fever were read by Dr. Sawyer, former Director of the yellow fever commission of the International Division of the Rockefeller Foundation at Lagos and now Director of the yellow fever laboratory in the Rockefeller Institute, New York, and by Dr. Duff, Principal Medical Officer of the Gold Coast, who gave an exposé of his 20 years' experience of yellow fever control in West Africa.

The statement by Dr. Sawyer entitled "The present knowledge of yellow fever as it relates to the problems in Africa" was described by Major-General Graham as a most valuable, lucid and precious contribution to this part of the work of the conference and as one which should be studied in detail by everyone interested in the subject. Briefly, Dr. Sawyer's paper may be divided into three sections: (1) the geographical distribution of yellow fever in Africa, (2) the barriers against the spread of yellow fever and (3) observations bearing on methods and control. He concluded by stating:

"You will probably agree with me that protective measures against yellow fever in Africa must be based on a full knowledge of the situation if they are to be effective. The Office International d'Hygiène Publique has urged the extension of the present immunity survey to other regions of Africa. I have mentioned the plans for Belgian Congo and French Equatorial Africa. In East Africa it would seem advisable to confirm the supposition that the region is entirely free of infection by taking serum samples from natives in a few representative centres. Health officials in the British Crown Colonies who wish to participate in such an immunity survey can arrange for the laboratory tests through Dr. G. M. Findlay and should send the blood specimens to him at the Wellcome Research Institute in London. He will decide whether to make the tests there or send the specimens on to the yellow fever laboratory in New York.

Many of us are interested in yellow fever in Africa. If we push the investigations and pool the information acquired, and meet together like this from time to time, I am sure we shall find a solution for our difficult problem."

Dr. Sawyer's paper was followed by an exposé on the yellow fever problem from the point of view of aircraft and its regulation by means of a convention by Sir George Buchanan. Sir George had circulated copies (a) of the Aerial Navigation Sanitary Convention, (b) a note prepared by him for the October meeting of the Health Committee of the League of Nations at Geneva on the Cape Town conference and its scope, and (c) an English translation of the report by the yellow fever commission of the Office International adopted at its plenary session in October 1932. He explained the various provisions of the convention article by article and showed how this aircraft yellow fever problem had not got a parallel in shipping.

After a discussion following Sir George's exposé, Dr. Duff read his paper on "Yellow fever control in the Gold Coast" which included sections on (a) actual control measures, (b) application of methods, (c) achievement, (d) new knowledge and (e) air transport.

**\*League of Nations Regional Health Conference at Cape Town, November 15-25, 1932.**

63. As a result of representations made in 1932 to the Medical Director by the Secretary for Public Health and Chief Health Officer of the Union Health Department of South Africa, the Bureau of the Health Committee which met in Paris in May, 1932, decided that the request should be agreed to and it was subsequently decided to hold the conference in Cape Town on 15th November, invitations being issued later to the governments of a large number of African countries, to the Government of British India as well as to the Rockefeller Foundation to send representatives.

The Bureau, with the subsequent assent of the Health Committee at its 19th session in October, 1932, nominated Sir George Buchanan to represent that Committee at the conference, and Dr. Park, Director, Eastern Bureau at Singapore, to be its general secretary. Major-General Graham was nominated as delegate for this conference by the Government of India and proceeded to Cape Town immediately after the meeting of the Office International which terminated on October 26, 1932.

The objects of this conference as proposed by the Government of the Union were "to discuss the prevention of yellow fever in Africa in connection with the draft International Convention for the Sanitary Control of Aerial Navigation, the adoption of uniform regulations for the prevention of the spread of smallpox from India and to study problems arising out of the continuous prevalence of plague in certain areas of South Africa, as well as those relating to the organisation of rural medical health services".

The conference was opened on November 15th in the House of Assembly by the Hon'ble Mr. J. H. Conradie, Administrator of the Cape Province, who took the chair in the absence of the Minister of Public Health. The Hon'ble Mr. Conradie, referring to the representative personnel of the delegates, said the conference realised the wish of the Union for greater co-operation between the Health Organisation of the League and the public health administrations of Africa in the combating and control of diseases of vital interest to the various countries, particularly when regard was had to the possibilities of infection spreading through modern methods of transport. He paid a tribute to the work already accomplished by the Health Section of the League in effecting international co-operation in health matters and he felt that this conference would mark another important step forward.

Twenty-two delegates in all attended the Conference, representing the League of Nations, the Rockefeller Foundation, British India, Angola (Portuguese West Africa), Mozambique (Portuguese East Africa), Kenya, Uganda, Zanzibar, Tanganyika, Bechuanaland, Basutoland, Southern Rhodesia, Northern Rhodesia, Nigeria, Gold Coast, South West Africa and Union of South Africa.

Provisional agenda had been drawn up and were considered at the first meeting on November 15th at which Sir George Buchanan was unanimously elected chairman. Four sub-committees on smallpox, leprosy, rural hygiene

---

\* Report of the conference is published in the quarterly bulletin of the Health Organisation, Vol. II, No. 1, March 1933.

"The Health Organisation could not remain indifferent to the economic depression which has affected the whole world. It took up the question of the effect which privations of all kinds due to unemployment might have upon the health of the masses and endeavoured in a preliminary report to outline the general nature of the problem, to point out where the work of health agencies might fall short of measuring up to the need as well as the danger of certain economies at the expense of the health services. This report was communicated to the Second Committee and to the members of the Health Committee, who will be called upon to consider how far useful public health study of this subject can be undertaken internationally."

"The Health Organisation has also endeavoured to make accessible to doctors, health officers and health administrations the results of the technical work done under its auspices. Hitherto, in order to follow the progress of its work, it was necessary to consult various documents, such as the proceedings of international conferences, minutes of committees, the reports of experts and annual reports, etc. To make such material more accessible and consequently to give it a wider circulation, it seemed desirable to publish it in a periodical appearing simultaneously in French and English, the Quarterly Bulletin of the Health Organisation, the first number of which appeared in March of this year."

"Further, I should mention here the Service of Epidemiological Intelligence, which functions with remarkable regularity both at Geneva and at Singapore. The Geneva office receives data on vital statistics and notifications of infectious diseases from most countries in the world, representing a population of 1,435 millions—that is, 72 per cent. of the world population."

"The Eastern Bureau, that outpost created by the Health Organisation at Singapore, carries on its work in the two fields assigned to it: on the one hand, the collection and distribution of epidemiological intelligence, and, on the other, the co-ordination of research on colonial pathology and hygiene. As regards epidemiological intelligence, it has been possible to fill in the gaps in the returns from China, as the National Quarantine Service of the Chinese Government now keeps the Eastern Bureau informed regarding the sanitary conditions of a number of ports on the Yellow Sea and the Yangtse River. Thanks to this service, the reorganisation of which was carried out in collaboration with the Health Organisation, it has been possible to follow the movement of cholera, which prevailed this year with unusual intensity at Shanghai and in a whole series of other ports."

"The number of Chinese ports for the sanitary supervision of which the National Quarantine Service is responsible has considerably increased in the last year, and the day is not far off when all Chinese ports open to international traffic will possess a quarantine service fulfilling the requirements of the International Sanitary Convention of 1926. The most fruitful collaboration exists between this service and the Eastern Bureau."

"The anti-epidemic campaign undertaken by the League through its Health Organisation not only benefits areas directly involved, but is also in the interest of the whole world. Here it might be fitting to quote the line from an ancient poem: "*Jam proximus ardet Ualegon*." If, in many instances, exchanges between countries are to-day restricted, with the result that the benefits of experience do not spread, there is still enough contact for evil influences to find their way—for example, contagious disease, which penetrates into the most remote regions. The results obtained by the Health Organisation in its campaign against epidemic diseases are described in detail in the Eastern Bureau's report."

After discussion this Committee proposed the following resolution to the Assembly:—

The Assembly,

Notes with pleasure that a number of Governments have responded to the appeal made last year on behalf of the flood victims in China, and

Thanks these Governments for their generous action, which constitutes a tangible proof of their spirit of international solidarity;

Is gratified that Governments and their health administrations are increasingly contributing to, and having recourse to, the experience of the Health Organisation in relation to those questions of hygiene on which the international co-operation provided by that Organisation is essential to progress, and values particularly the machinery which permits such Governments to obtain consultative opinions and the technical collaboration of that Organisation;

Considers that the Health Organisation, by means of its expert enquiries, its service of epidemiological intelligence, including that of the Eastern Bureau, and by the missions undertaken under its authority, fulfils the requirements of Article 23 of the Covenant, by virtue of which the League of Nations will endeavour to take international measures to prevent and combat disease.

Takes note of the report which has been submitted to it on the work of the Health Organisation, and approves the work carried out by that Organisation since the last session of the Assembly.

Denys Bray, K.C.S.I., K.C.I.E., C.B.E. (Member of the Council of India). The substitute delegate was Sir Jehangir Cooverjee Coyajee, Kt. (Head of the Department of History, Economics and Politics, Andhra University).

Sir Jehangir Coyajee was the Indian representative on the Committee dealing with the Health Organisation. The delegate's report on the second Committee reads as follows :—

"The report in the Appendix gives an adequate summary of the work, much of it of the first importance to the world in general and to India in particular, which the Organisation is carrying out in an ever-widening sphere."

"Sir J. Coyajee spoke on the general value of its work and on its importance to the East. He said that India particularly appreciated the very useful work of the Malaria Commission in its manifold lines of activity, and he singled out as an item of special interest for India, the proposed establishment of an international centre for malarial studies for the East at Singapore. The intention, he understood, was to hold at the Medical School in Singapore, under the auspices of the Eastern Bureau, and under the direction of the Medical School and of distinguished malariologists from the various Eastern countries, a series of courses in malaria to each of which two students would be invited from each country. This project was to be welcomed warmly and would manifest the growing interest of the League in problems relating to the East."

"He mentioned the admirable efforts of the Organisation in connection with rural hygiene. The study of this topic was of the highest value, especially to agricultural countries, and last year's Conference on Rural Hygiene marked an important step forward. As that particular Conference dealt mainly with European conditions, and was primarily meant for European experts, India and the Eastern countries were not likely to benefit by it to any very great extent. But in view of the high value of the study of rural hygiene to all Eastern countries he expressed the hope that at some future date, and as soon as the state of finances permitted, a special Conference might be held in the East with reference to the conditions peculiar to those parts of the world. Nothing could serve better to bring home to every village and hamlet throughout the wide East the beneficial activities of the League."

"It would hardly be possible for one speaking on behalf of India to omit a mention of the increasing value of the Eastern Bureau at Singapore. The Bureau had been of immense value to the cause of medical research work in the East, covering, as it did, the wide field of diseases like plague, smallpox and leprosy. The Bureau might indeed be said to be the *avant courier* of the League's great work for the East—a work which might give food for thought to the school of pessimists."

"Sir J. Coyajee's suggestion as regards a Conference in Rural Hygiene for the East was supported by the Chinese delegate and was referred to with approval by the Rapporteur in his closing speech. It will be seen that the report, approved by the Assembly, invited the Health Committee to examine the possibility of holding such a Conference and to report thereon to the next Assembly."

The following observations are taken from the remarks made by the President in his opening address :

"Lastly, the French Government has offered to create in Paris an International School of Advanced Health Studies under the auspices of the Health Organisation. The Chamber of Deputies has already ratified this proposal, and the Committee noted with special appreciation the statement of the French delegation that the Senate would adopt the Bill not later than the beginning of November ; thus the opening of the school might take place in the near future. It will constitute for the Health Organisation a particularly valuable means of carrying out certain of its aims. When the latter was asked to give its technical help to various Governments, one of the most important problems with which it was faced was that of training medical officers of health. Through its system of liaison with the Health Administrations, it sought to give health experts in the various countries an opportunity of keeping in touch with progress made abroad. It endeavoured to organise actual international training by means of collective study tours, individual missions and exchanges of staff between the Health Administrations. The contact thus established between the health officers of various countries has brought about a valuable interchange of ideas and made possible the comparison of divergent conceptions. The International School of Advanced Health Studies, as planned, will give a permanent character to this system. This is a particularly valuable application of the general idea of international co-operation which is the real object of the League of Nations."



*The economic crisis and its effects on public health.*—The appreciation of the situation by the Health Organisation given in their report (A. 11/1. 1932) provided a basis for discussion of this very difficult but important problem and led to various interesting view-points regarding different countries. One fact which emerged was that in many countries the state of nutrition had not deteriorated but had even improved during the crisis. It was shown how many health organisations were being attacked and depleted; how nutritional effects might be postponed; how pellagra might become epidemic in some places; how physiological disturbances were probably on the increase as a result; how agricultural countries were suffering as well as industrial countries; how maternity and child welfare services were amongst the first to suffer; and how 'jungle' colonies in the suburbs of the big continental cities were developing as a means of subsistence and existence and were creating sanitary problems.

The Medical Director's proposals for the resolution by the drafting committee were as follows: (1) definition of the outlines of action to be usefully taken by the Health Organisation by (a) defining the problem, (b) keeping to problems which the health administrations had to face and (c) deciding on the methods to be adopted; (2) determination of the state of individual nutrition of populations, i.e., by a general investigation of a clinical or social kind; (3) study of diets; (4) study of the disorganisation of health organisations and services by drastic budget reductions. The Health Organisation must take a very decided line against these, many of which were ill-considered and haphazard; (5) study of health problems of 'jungle' settlements for unemployed; (6) consideration of the psychopathological point of view; (7) collaboration of the International Labour Office (League of Nations); and (8) study of pellagra in certain populations and localities.

*Singapore Bureau.*—Major-General Graham, as a member of the sub-committee of this Bureau, furnished full information to the chairman regarding its working on a budget of Straits \$105,267. A resolution was adopted approving the resolutions of the Advisory Council for 1933 and emphasising the Bureau's importance in the Health Organisation work.

Among the miscellaneous questions which received consideration were: (1) study of propaganda methods; (2) enquiry on the results of radiological treatment of cancer; (3) study tours, the proposal being a collective tour in Poland; (4) work for 1933 and (5) examination of the revised text of the conclusions of the reporting committee on tuberculosis. Major-General Graham's report is an interesting one and in the appendix to that report he lists 60 annexures which were distributed during the session. Copies of these have been filed in the office of the Public Health Commissioner.

### **The Indian delegation to the 13th (ordinary) session of the Assembly of the League of Nations.\***

62. The Indian delegation consisted of His Highness the Aga Khan, G.C.S.I., G.C.I.E., G.C.V.O., Leader of the Delegation, Sir Prabhashankar Pattani, K.C.I.E. (President of Bhavnagar State Council), and Sir

---

\* Report published by the Government of India, Central Publication Branch, Calcutta, 1933. Price annas 12.

The epidemiological intelligence service both at Geneva and Singapore continued on improved lines and the original reports of the League should be studied by those who are interested in the details of its work.

(b) The 19th session of the Health Committee, Geneva, held from October 10th-15th, 1932, was attended by Major-General Graham. The minutes have been recorded in *proces-verbaux* in the report of the Health Committee and the report of the session has been published in document C. 725. M. 344, 1932. A special report on the session was prepared for the Government of India by Major-General Graham in which he laid stress only on the more important points.

The Medical Director's report on the work of the Health Organisation since November, 1931, was presented at this session, as also a report of the Medical Director on his mission to China and the report of the sub-committee of the Advisory Council of the Eastern Bureau at Singapore. The Medical Director's report included the following sections which were discussed *seriatim* and approved: (1) work of the commission on biological standards, (2) conference on standardisation of sex hormones, (3) commission on fumigation of ships, (4) European conference on rural hygiene, (5) technical co-operation with the governments of China and Greece, (6) international school of advanced studies and (7) epidemiological intelligence and statistics.

*Malaria Commission.*—This commission dealt with practical epidemiological enquiries, courses in malariology, quinine requirements enquiry and research work. The co-ordinated malaria researches had been concerned with treatment, malaria in the great deltas and housing in relation to malaria. Further researches in regard to the great deltas were accepted but Major-General Graham was unable to give any assurance of immediate information in regard to the Ganges delta in view of the depleted staff of the Malaria Survey of India.

*Opium Commission.*—The report of this commission dealt with (1) Dr. Anselmino's proposal for a new method of preventing the consumption of narcotics in various countries, (2) treatment of drug addicts, (3) Article 8, 1925 Convention, (4) methods of ascertaining morphine content in various opiums, (5) heroin pills and (6) opium consumption in Germany.

*Tuberculosis.*—The draft report of this committee, having been presented, various delegates took part in the discussion and Major-General Graham gave a description of the work being carried out in India, explaining in the course of his remarks the work which had just been started by the King George Thanksgiving (Anti-Tuberculosis) Fund. At the conclusion of a long discussion Dr. Burnet summed up the views which had been expressed and concluded by saying: "It had been said that social hygiene represented the equality of the classes in respect of health, *i.e.*, in respect of medicine and hygiene. This saying was sufficient to characterise the conditions and general trend of the prophylaxis of tuberculosis."

*Veneral diseases.*—Dr. Jadassohn explained that the first part of the committee's work had concerned sero-diagnosis and treatment and later work had concerned the social hygiene side. The discussion which followed showed clearly how delicate and difficult a matter the preparation of such a report was.

course should have the opportunity to study field work in a country other than in which they usually work.

*International Health Conference.*—Dr. Park, the Director of the Bureau, attended the International Health Conference at Cape Town in November, 1932.

*General.*—Apart from the purely medical activities, endeavours were made to keep the League and its work before the public generally. Every opportunity has been taken to give lectures to selected audiences and to furnish articles on the working of the Bureau and the Health Organisation to local journals. The rôle of the Bureau and its place in the health work of the Far East has now been firmly established as a result of the enthusiastic labours of the whole staff.

### Health Section of the League, Geneva.

61. The work of this Section can, as usual, be best dealt with by examining :—

- (a) the annual report of the Medical Director on the activities of the Health Section for 1932 as presented in his progress reports of January, 1931, to September, 1932 (A. 28, 1932. III) and of October, 1932, to September, 1933 (A. 13, 1933. III), and
- (b) the work done by the Health Committee at its 19th session, October 10th-15th, 1932 (C. 725. M. 344., 1932).

(a) The two progress reports present in approximately 60 pages each a complete resumé of the activities of the Health Section. It is of course impossible to make here any satisfactory summary and the original reports should be referred to for details. League health commissions and sub-commissions were at work during 1932 on (1) biological standardisation, (2) malaria, (3) opium, (4) fumigation of ships, (5) leprosy, (6) maternal welfare and the hygiene of infants and children of pre-school age, (7) control of tuberculosis and (8) rural hygiene.

The epidemiological and statistical and the general sections issued many valuable reports, lists of which are given in the two progress reports under consideration. The publications appear under (a) epidemiological intelligence and statistics, (b) quarterly bulletin of the Health Organisation, (c) special studies and investigations, and (d) reports and minutes of the Health Committee sessions. The quarterly bulletin which was issued for the first time in 1931 has been successfully continued and in it many important articles appeared which are well worth study.

Technical co-operation with various health administrations for specific purposes took place. These include co-operation with the :

- (a) National Government of the Chinese Republic in re-organising its health administration in accordance with the plans drawn up in co-operation with the Health Organisation in 1929,
- (b) Greek Government with special reference to the health centre at Athens,
- (c) Union of South Africa which had asked the Health Organisation whether it would be willing to summon a conference of Directors of Public Health Services in certain African territories with the object of discussing public health matters of common concern and in need of urgent solution.

Of the deaths during transit, 1 was due to pulmonary tuberculosis and 12 to non-infectious enteritis.

*Quarantine notifications.*—A large number of administrations have notified the application of quarantine measures against infected ports. The diseases in question were : plague, cholera, smallpox and cerebro-spinal meningitis.

*Disease incidence in ports.*—Plague was concentrated in 4 ports, namely, Bombay, Colombo, Bassein and Rangoon; Hongkong remained free of the disease. Bombay had a somewhat heavier infection than was experienced since 1928 and plague-infected rodents were found every week during the year. A continuous intensive rat-trapping campaign was carried out in Bombay and it was reported that in the actual dock area controlled by the port authorities only 1 plague-infected rat was found during the year. In Rangoon, the number of cases was almost double that for 1931, these being spread more or less evenly over the first 9 months of the year. Rodent plague was continuously present but much work has been carried out in recent years in investigating the rat-flea conditions of the city and also of barges and ships. In Bassein, the number of human plague cases showed some increase over the previous year and the disease was endemic for the first 9 months, although 2 human cases occurred in October and November which showed that the disease was still smouldering there. Colombo still recorded the largest number of human plague infections in eastern ports; infected rodents were found irregularly until October, when their numbers showed a considerable increase.

A large part of the report was devoted to the epidemiology of plague, cholera and smallpox in countries of the Far East. These pages give very valuable information which it is impossible to summarise here and which should be consulted in the original.

*Research programme, Plague.*—Dr. Hirst has continued his researches on plague in Ceylon; and King and Pandit in Madras have issued a summary of the rat-flea survey of the Madras Presidency. Col. Jolly has completed his rat-flea survey in Rangoon and the problem of the seasonal prevalence of plague in Java has also occupied the attention of Dr. Otten, the Director of the Pasteur Institute, Bandoeng. In Shanghai also a rat-flea survey has been carried out during 1932.

*Bacteriophage.*—The work of Dr. Asheshov, Captain Pasricha and Lt.-Col. Morison received attention, while the Medical Research Council report for 1930-31 was also quoted.

*Liaison work.*—This included not only the distribution of documents but also laboratory work in regard to *B. pestis* and *V. cholerae*.

*Study tours.*—Dr. Chun, Senior Quarantine Officer, Shanghai, commenced a study tour under the auspices of the Health Organisation during which facilities were given to him to investigate the theory and practice of quarantine in the ports of Hongkong, Singapore, Batavia, Soerabaya and Manila.

*Malaria courses.*—The proposal to establish international malaria courses in the East has been approved and arrangements were in hand for the first of these courses to commence on 30th April, 1934. The League proposed that the theoretical work should be carried out at Singapore and the practical work in several eastern countries, the arrangement being that members of the

During the 13th Assembly the work of the Health Organisation was reviewed by the 2nd committee, when complimentary references were made by several delegates to the Bureau's activities. In particular, approval was expressed of the proposal to establish international malaria courses in Singapore under the technical direction of the medical college. The delegates of British India and of China expressed the hope that at a later date a Rural hygiene conference, similar to that held in Geneva, might meet in the Far East in order to deal with questions of rural hygiene of special interest to eastern countries.

At its 19th session, held in Geneva in October, the Health Committee of the League of Nations considered the report of the Bureau for 1931 and the budget estimates for 1933, and adopted the following resolution :

"The Health Committee approves the resolutions adopted by the Advisory Council of the Singapore Bureau, as well as the attached budget estimates for 1933. It desires to emphasise the importance of this Bureau, which constitutes one of the essential elements of the Health Organisation."

The epidemiological intelligence service constitutes the main function of the Singapore Bureau. This service has been steadily built up during the 8 years that have elapsed since the Bureau commenced to function and now consists of three sections for the reception, collation and distribution of information. The reception service covers the whole of the eastern arena, extending on the west as far north as Alexandria and Syria, on the south-west to the Union of South Africa ; on the north-east to Vladivostok ; on the south-east to Australia and New Zealand, and as far into the Pacific as the Hawaiian Islands. From the health administrations of this extensive area, communications are received regularly by cable or by post and information is now cabled from 163 ports. After receipt of the information in the routine cables, the distribution of that information is effected by wireless transmission, telegraphic communication and postal circulation of a weekly Fasciculus. The Bureau report indicates in detail the methods adopted to effect a reliable and speedy distribution.

*Infected ships.*—The number of ships from which disease was reported totalled 188. Ships infected with cholera numbered 30, of which 10 were in port at the time the infection was discovered. Of the above, 3 were presumably affected in Calcutta ; Shanghai could have been the source of infection of 23 ; Tsingtao would seem to have been the source of infection in 3 cases. The number of vessels notified from eastern ports to have smallpox on board was 44. Only one vessel was reported to have a case of 'suspected' plague on board on arrival ; chicken-pox was reported from no less than 72 vessels during the year.

*Pilgrim traffic.*—The total number of ships carrying pilgrims was 9 from Karachi, 10 from Bombay, 6 from Egypt, 4 from Straits Settlements and 20 from Netherlands East Indies. A very great diminution in the number of pilgrims occurred as compared with 1931, this being particularly noticeable in the numbers from the Netherlands East Indies, which were 4,467 as compared with 15,493 in the previous year. Two pilgrim ships were found to be infected on arrival at Bombay, one having 6 cases of smallpox on board and the other 1 case of typhoid. In addition, three ships returned with patients suffering from malaria, 1 with tuberculosis and 5 with sporadic cases of enteritis.

were found to be carriers though none had or developed the disease and Baghdad was free of it and Syria never developed it.

(b) Owing to the importance of obtaining a standard agglutinating serum which should be adopted in all laboratories as an index of virulence, a standing commission on cholera, parallel to those on yellow fever and smallpox, was formed to settle this question not by research but by comparison of samples. Major-General Graham who was nominated as a member of this commission stressed the need for collaboration with the larger scientific bodies in Europe and America such as the Rockefeller Foundation, the League of Nations, the Medical Research Council, the Royal Society and the Pasteur Institute, Paris, both with a view to getting men of the requisite calibre to undertake investigations and with a view to financing the work. This view was largely accepted. Among other countries, India was asked to carry out the necessary tests of antigens and serums. A reference was made by Dr. Madsen as to the carrying out of certain tests in India on types of cholera vibrios sent by him.

(c) The yellow fever commission submitted a report on the most recent knowledge concerning this disease which was adopted by the plenary committee of the "Office". Drs. Sawyer and Beeuwkes of the Rockefeller yellow fever commission attended to answer questions and give explanations regarding the additions to our information which had been embodied in this note. No alterations were made in the final section dealing with the dangers of the carriage of yellow fever by air craft. This report was circulated at the Cape Town conference.

(d) The quarantine commission dealt chiefly with questions of interpretations and with complaints. Methods of rat searching were discussed as was double fumigation and it was agreed that there was a case for altering Article 25 so as to provide for this. Exception was taken to laying down standards for sulphur dioxide concentration in the absence of reference to the Clayton method and of other documentation. It was agreed to eliminate these high standards till they were reconsidered at the next session. Major-General Graham reported that British India could be added to the list of countries which were willing to dispense with visas.

#### **Singapore Bureau, League of Nations.**

60. The 1932 report of the Bureau opened with the remark that this year for the first time no meeting of the Advisory Council took place. This was in accordance with the Assembly decision that as few meetings as possible of committees of the League should be held on account of the financial situation. The budget for 1933, the financial statement and the Director's report were circulated for individual consideration of members.

Only the more important aspects of the work of the Bureau can be mentioned here and for details the Director's report must be consulted.

There was no change in the staff, but the absence of a statistician was said to leave a definite gap in an organisation the main function of which consists in interpreting statistics. Dr. H. F. Smith succeeded Dr. R. W. Hart, Chief Quarantine Officer for Manila, who has always attended the meetings of the Council as an observer.

before the formal introduction of the code, the committee did not aim at the establishment of a formal agreement but rather at a recommendation of the extension of a system regarded as useful both to sanitary and shipping authorities.

(c) The discussions on plague centred round the efficacy of anti-plague inoculation. In this connection, the preliminary report by Naidu and Taylor based on work done at the Haffkine institute, Bombay, was by far the most important and the Indian work in general was regarded as a very important contribution to public health. Major-General Megaw pointed out that there was very strong evidence in support of the efficacy of anti-plague vaccine. Other countries interested in the subject were Egypt, Italy and Morocco. With the removal of misunderstandings as to the efficacy of inoculation, it is hoped that this measure will soon be placed on a satisfactory footing as a valuable means of reducing the incidence and mortality from plague. Other contributions from India included (i) a note on the serum therapy of plague by Naidu and Mackie and (ii) a resumé of the report on rat fleas of the Madras Presidency by King and Pandit.

(d) The smallpox committee presented a brief but interesting report. In French Equatorial Africa the intensive use since 1924 of dried lymph, to the exclusion of other varieties, was reported to have given excellent results. In regard to the questionnaire on anti-smallpox vaccination issued to the delegates in 1931, it was proposed to present a complete report to the "Office" in due course.

(e) The discussions on c. s. meningitis included a reference to the outbreak of the disease in the Borstal institute, Lahore, which General Megaw considered might be regarded as a danger signal.

(f) Although there was no formal discussion on the subject of cholera, two contributions were submitted. The first by Dr. De Vogel dealt with the important question of the "El Tor" vibrio which has been regarded as a true cholera vibrio because it is agglutinable with cholera serum. The second was presented by the Egyptian representative on "Symbiosis of the cholera vibrio with bacteriophage". At the request of Dr. Madsen who was working on the preparation of a standard cholera serum, Major-General Megaw agreed to secure the co-operation of Indian workers.

(B.) Major-General Graham attended the October session of the "Office". The sudden and regrettable death of M. Velghe, the President of the "Office", while attending the meeting of the Health Committee of the League of Nations, cast a gloom over the whole session. Delegates from 35 countries attended and 87 notes and reports of different kinds were distributed.

(a) The subject of cholera was opened by the reading of two papers, one from the Japanese delegate describing certain "intermediate types of cholera vibrio" and the other from the Egyptian delegate giving negative results of examinations made for the detection of the cholera vibrio in stools of pilgrims departing from Egypt for the Hedjaz and dealing with the examinations made of pilgrims returning to Egypt at the Tor quarantine station. The carrier problem and the significance of cholera inoculation were considered in the light of the report of the Syrian epidemic. Dr. Morgan gave a resumé of the events in the Iraq epidemic when 40% of the Baghdad pilgrims travelling to Syria

annexures was as usual printed in brochure form. Delegates from 47 countries attended, those being ordinarily the heads of the public health services of their respective countries.

The more important items dealt with were :—

(a) *The International Sanitary Convention for Air-traffic*.—Discussions were concentrated on interpretations arising out of Article 48 (old 44) of the convention. Although the terms of this convention had been agreed to in principle by nearly all the delegates at a previous meeting of the "Office", the Government of India still held that the convention did not give complete protection to India and other countries against the risk of importation of yellow fever by aeroplanes. The delegate for India while explaining the Indian point of view emphasised the necessity of threatened countries having the right to prohibit the entry of aeroplanes coming from infected countries. The yellow fever commission unanimously agreed that in order to prevent future misunderstandings the following interpretation should be inserted in the proceedings of the "Office".

"It is the opinion of the "Office" that it will be for the country of arrival of aircraft to be the sole judge as to whether the circumstances justify the exercise of the right of prohibiting the entry of the aircraft into its territory : it follows that any country which may decide to exercise this right would communicate to the "Office" the reasons for its decision."

It was also agreed that after the adoption of the convention the yellow fever commission should continue its work on the investigation of that disease and on extension of these investigations so as to include the study of all the facts as well as the scientific and administrative problems connected with yellow fever. The aim was to enable the "Office" to render advice to all governments concerned and to recommend necessary modifications of the convention in the light of further experience. These recommendations of the commission were adopted at the plenary session and a number of other textual modifications of the convention were agreed to at the suggestion of the British Government.

(b) The work of the quarantine commission related chiefly to (i) the report on the findings of the "Committee on the Fumigation of Ships" ; (ii) representations from shipping firms and governments regarding the interpretation of Article 28 of I. S. C. 1926 ; (iii) the interpretations of Article 47 of I. S. C. 1926 ; (iv) methods of recognising the presence of rats on ships ; (v) interpretation of the term "Port d'Attache" ; (vi) vaccination certificates ; and (vii) campaigns against rats in general.

On the representation of the Government of India regarding the impracticability of the rule calling for a certificate of "successful vaccination undergone at least 12 days and not more than 3 years before the date of sailing", the following amended form of the rules was accepted :—(1) "If he has a certificate of vaccination or revaccination from a doctor showing that he has been properly vaccinated not less than 12 days and not more than 3 years before the date of departure ; or (2) if he has marks showing that he has had smallpox."

With regard to the proposal to introduce, as a voluntary measure, the use of the international code of signals for wireless reports on sanitary matter

---

"Office".—Office International d'Hygiène Publique. 195, Boulevard Saint-Germain, Paris.

I. S. C.—International Sanitary Conventions



## SECTION V.

MEDICAL INTELLIGENCE AND INTERNATIONAL HEALTH  
INCLUDING PORTS.**Indian Epidemiological Intelligence.**

57. The weekly bulletin, published by this office, contains a summary of epidemiological information concerning both India and other countries. This "epidemic diseases summary" is to some extent the counterpart of the weekly record of "Infectious Diseases of Ports" issued by the British Ministry of Health but contains additional information of special interest to health officers. Part I is concerned with India alone and is distributed widely throughout India and in foreign countries; Part II, which mainly supplies information from outside India and is distributed in India only, consists of 6 sections dealing with vital statistics, quarantinable diseases and other health matters under the following categories :--

- (a) The latest weekly wireless statement of the League of Nations, Health Organisation, Eastern Bureau, Singapore, as broadcasted from Saigon and Malabar (Java).
- (b) Epidemic disease incidence of foreign countries and ports, excluding Great Britain and the United States of America.
- (c) The latest weekly information from Washington of deaths from all causes in certain large cities of the United States of America.
- (d) Extracts from the weekly statement on England and Wales issued by the British Ministry of Health.
- (e) A list of foreign countries and ports in which known or suspected cases or deaths from cholera, smallpox, plague, typhus and yellow fever occurred during the 12 weeks ending the period to which the weekly summary relates, and
- (f) Notes on public health matters; communications from the "Office International"; proceedings of the Quarantine Commission of the "Office International"; articles on port health, etc.

**General.**

58. The activities of the Office International d'Hygiene Publique and the Health Section of the League of Nations are as usual described in some detail in so far as they concern the bi-annual meetings of the former in Paris on the one hand and the Singapore Bureau, the Health Committee of the League of Nations and its various Commissions on the other.

**Office International d'Hygiene Publique, Paris.**

59. (A.) Owing to the unavoidable absence of Major-General Graham who is the usual delegate of the Government of India, Major-General J. W. D. Megaw, I.M.S., attended the spring session which was held between 25th April and 4th May, 1932. Major-General Megaw's report with a list of 97

TABLE IV (*ix*)—*contd.*

	Cases.	
	1932-33.	1931-32.
Malaria . . . . .	8,657	8,040
Kala-azar . . . . .	96	91
Tuberculosis . . . . .	109	89
Leprosy . . . . .	9	..
Hookworm . . . . .	9	20
Other worms . . . . .	288	389
Injuries . . . . .	11,068	10,269
Diseases of ear . . . . .	3,030	2,767
Diseases of eye . . . . .	4,511	4,020
Diseases of nose . . . . .	404	898
Other causes . . . . .	64,616	97,665

The very low incidence of cholera was ascribed to improved water supplies and better supervision and control of food stuffs, but cholera was generally at a minimum throughout India. *A. minimus* is reported to be the commonest species of mosquito. The treatment of borrowpits was carried out in co-operation with the anti-malaria association of the Indian Tea Cess Association, the Barrackpore anti-malarial association and the Dacca municipal and cantonment authorities. Mechanical protection against mosquitoes by screening of houses received attention.

The railway ambulance association embraces 7 association districts, 4 ambulance divisions, and 1 nursing division. 12 stretcher-bearer parties worked in connexion with accident relief trains. Of the 399 persons trained in first-aid, 287 obtained certificates and 4 vouchers.

The laboratory at Calcutta examined 3,925 blood specimens, 73 sputa, 479 urines, 131 stools and 57 others; whilst 40 autogenous vaccines were prepared, 220 samples of water were analysed and 4 specimens were tested for blood sugar. The identification of adult anophelines and larvae was also carried out at this laboratory. The laboratories at Kanchrapara, Saidpur and Lalmonirhat carried out similar work.

The incidence of malaria was as usual highest in October with 1,005 cases and lowest in June with 367 cases. Anti-malarial measures included systematic destruction of larvae and prevention of breeding by regular cleaning and oiling of drains, by drainage and by filling of pits and depressions. Influenza prevailed throughout the year, the maximum incidence occurring in October and the minimum in March. 1,180 inoculations against plague, 4,590 against cholera and 11,737 vaccinations were performed.

A total of 1,408 live births, giving a rate of 11 p.m., was registered. Deaths numbered 674, the rate being about 6 p.m. The infantile mortality rate within railway premises fell from 209 to 184 per 1,000 births; Bombay district recorded the highest rate, 255, and Bhusaval district the lowest, 67. 24 still-births were recorded.

At the anti-rabic treatment centres at Byculla and Jhansi, 175 and 49 cases respectively were treated. In addition, 39 cases were treated at the Jalgaon civil hospital and 81 at other non-railway institutions.

Accident relief medical equipment was maintained at 37 railway stations and 369 first-aid boxes were supplied to the transportation department. 60 classes in first-aid were held and of the 467 candidates, 321 obtained certificates, 16 vouchers, 2 medallions and 4 labels.

#### Eastern Bengal Railway.

The medical and health staff included a chief medical officer, 3 district medical officers, 1 malariologist, 1 assistant medical officer, 12 assistant surgeons, 53 sub-assistant surgeons, 10 nurses, 21 sanitary inspectors, and 1 malaria inspector.

The railway population remained remarkably free from epidemic disease although there was greater prevalence of these diseases in the non-railway community. Table IV (*ix*) gives details of cases treated. Although the total number was less than the figure for 1931-32 by 33,036, the number of days lost on account of certified sickness of the staff increased from 257,694 to 266,205 due partly to the greater prevalence of smallpox and partly to the fact that malaria cases increased from 38,880 to 44,141. 14 hospitals with a total of 169 beds treated 2,134 indoor cases or 12 per bed. Anti-cholera inoculations numbered 2,234 and vaccinations 16,384.

TABLE IV (*ix*).

	CASES.	
	1932-33.	1931-32.
<b>Total cases</b>	<b>103,563</b>	<b>136,599</b>
Cholera	15	38
Smallpox	91	13
Influenza	8,803	10,131
Dysentery	1,594	1,941
Enteric Fever	106	74
Gonococcal infection	95	85
Syphilis	62	69

the principal medical and health officer 11 district medical officers, 1 drug inspector, 2 assistant medical officers, 21 assistant surgeons, 38 sub-assistant surgeons, 6 matrons, 20 nursing sisters, 5 nurses, 6 health assistants, 25 sanitary inspectors, 1 malaria overseer and 49 dispensers. The cost of medical services aggregated Rs. 5,97,393 and that of health services Rs. 4,24,752.

109,984 railway employees and 61,551 members of their families were treated at the different railway dispensaries, whilst the daily average attendance of employees at the railway hospitals and dispensaries was 1,348. The number of days lost due to certified sickness was 608,312, or 7 days per employee, the resultant financial loss amounting to Rs. 9,51,976. The most important causes of sickness were malaria and other fevers, especially in Bhusaval district; nearly 8% of the total strength suffered from malaria and 13% from other fevers.

Tables IV (vii) and IV (viii) give the incidence of certain diseases :—

TABLE IV (vii).

	Employees.		Families.		Public.		Construc- tion work.		Total.
	In- door.	Out- door.	In- door.	Out- door.	In- door.	Out- door.	In- door.	Out- door.	
Cholera . . . . .	71	4	3	10	..	..	..	..	14
Dysentery . . . . .	27	1,884	4	978	..	61	30	..	3,027
Enteric fever . . . . .	..	39	..	24	..	1	..	..	95
Malaria . . . . .	250	6,725	17	2,647	8	217	80	60	10,004
Plague . . . . .	..	14	..	15	..	..	..	..	29
Influenza . . . . .	78	6,712	4	2,918	3	325	18	4	10,062
Leprosy . . . . .	..	10	..	2	..	3	..	..	15
Kala-azar . . . . .	..	1	..	..	..	..	..	..	1
Pyrexia, uncertain origin . . . . .	117	4,921	2	3,596	..	165	443	233	9,477
Smallpox . . . . .	6	33	..	166	..	..	1	..	206
Tuberculosis lungs . . . . .	63	77	10	50	2	11	..	..	213
Other tubercular disease . . . . .	16	13	9	14	1	6	..	..	59
Scurvy . . . . .	2	..	..	2	..	..	..	..	4
Rheumatic fever . . . . .	4	104	1	97	..	4	3	1	214
Gonococcal infection . . . . .	31	341	5	26	2	19	..	..	424
Soft sore . . . . .	11	125	..	3	..	..	..	..	139
Syphilis . . . . .	55	289	1	75	..	47	2	1	470

TABLE IV (viii).

	Malaria	Fevers.	Per cent. to total strength.
Bhusaval . . . . .	2,193	3,955	22.5
Igatpuri . . . . .	703	1,809	9.7
Bombay . . . . .	1,811	5,078	6.5
Sholapur . . . . .	400	1,316	6.3
Jhansi . . . . .	1,096	3,381	5.4
Jubbulpore . . . . .	391	1,351	5.4
Nagpur . . . . .	381	2,087	3.6
Total	6,975	18,977	7.8

**Madras and Southern Mahratta Railway.**

Indoor attendances at the 5 hospitals during 1932-33 were as follows :—

	1932-33.	1931-32.
Perambur . .	1,609	1,752
Hubli . .	782	746
Guntakal . .	284	396
Bezwada . .	144	173
Vasco-de-Gama	34	23
<b>TOTAL</b>	<b>2,853</b>	<b>3,090</b>

479 major operations were performed. The X-ray department and the bacteriological and biochemical laboratory at Perambur did useful work. First-aid posts dealt with 706 accidents and 11,397 cases of minor ailments.

Of a total of 297,317 cases treated during 1932-33, malaria accounted for 5,457, dysentery 4,707, diarrhoea 2,932, typhoid fever 117, measles 61, smallpox 49, plague 20, cholera 3 and accidents and other diseases 283,971. The incidence of malaria continued to fall as a result of energetic anti-malarial measures. Anti-cholera and anti-plague inoculations numbered 77 and 7,184 respectively and 7,540 vaccinations against smallpox were performed.

Of 302 employees instructed in ambulance work, 144 passed the test. First-aid equipment was as usual provided in the guards' vans in passenger trains.

A child welfare centre was opened at Perambur ; the midwives attached to this centre conducted 121 railway and 18 other maternity cases.

**South Indian Railway.**

A total of 36,691 cases were treated including 14,879 cases of infectious disease. Labour cases numbered 21. The total loss on account of sickness was 241,659 days or an average of 6.5 days per head. The death rate amongst employees was 3.6 p.m. Influenza was responsible for 4,206 cases and the number of days lost through this cause was 24,049. Dengue caused 17 cases ; cholera 2 non-fatal cases and smallpox 179 cases with 8 deaths. Smallpox occurred mainly among the families of employees residing outside railway premises. The number of vaccinations increased from 866 to 4,961. Plague was absent. The prevalence of bowel diseases was under investigation. It was proposed to treat water supplies with bacteriophage during the ensuing year. 213 cases were given anti-rabic treatment. Six tuberculosis cases were under treatment at the Coonoor sanatorium.

Sanitary and conservancy arrangements were on the whole satisfactory. Ambulance classes were held as usual. 285 employees completed the full course of lectures in first-aid and 103 including 5 officers passed. First-aid equipment was provided as usual in passenger trains. Medical examination of school children was continued.

**Great Indian Peninsula Railway.**

To meet the medical and sanitary needs of a total population of 89,330 spread over 3,627 miles of railway line, this railway maintains in addition to

## Burma.

Under the Burma Food and Drugs Act, 1928, standards for *ghee*, butter and coffee were under consideration by the local Government. A total of 669 samples of foods and drugs were examined in the chemical section of the Harcourt Butler Institute of Public Health. These included 246 specimens of rice, 146 of *ghee*, 97 of milk, 57 of oils, 40 of *atta* and 83 others. Of 159 samples found to be unsatisfactory or adulterated, 99 were rice, 22 *ghee*, 20 milk, 11 oils and 7 others. Under the Burma Ghee Adulteration Act, 91 samples of *ghee* from Rangoon were examined; 12 were reported to be grossly and 2 slightly adulterated. The number of samples taken in Akyab and Mandalay was too small to call for comment.

## Railways.

### Bombay, Baroda and Central India Railway.

56. In addition to the chief medical officer, this railway employed 7 medical officers, 66 assistant and sub-assistant medical officers, 58 compounders, 2 matrons, 5 nursing sisters, 5 nurses, and 1 anti-malarial inspector. Subsidies were granted to the civil surgeons of Ahmedabad, Agra, Muttra, Neemuch, Mhow, Khandwa, Fatehgarh and Hissar and other civil and State medical officers for medical service to the railway staffs. A total of 394,079 cases, including 342,119 new cases were treated at the railway dispensaries in 1932-33 as against 407,562 and 344,423, respectively, in 1931-32. Causes of sickness are available in respect of 332,923 cases only; airborne 49,647 cases, food and waterborne 37,805, insect-borne 52,519, infectious diseases 801, pyrexia of uncertain origin 17,450, diseases of direct contagion 825, food deficiency 17, injuries 29,224, other causes 144,635. The average loss of time per employee varied between 5.5 days for subordinates and menials drawing less than Rs. 30 p.m. and 8.5 days for subordinates paid from Rs. 30 p.m. to Rs. 250 p.m. 10,403 surgical operations were performed. Facilities for X-ray examination existed at Ajmer and Freelandganj, the numbers of such examinations being 249 and 37 respectively.

No cases of cholera and plague were reported. Most of the 97 cases of smallpox occurred amongst the families of employees; 63 with 1 death among the vaccinated and 34 with 5 deaths among the unvaccinated. Other infectious diseases included 257 mumps, 223 measles with 1 death, 96 chickenpox and 5 diphtheria with 2 deaths. Malaria cases numbered 26,034 as against 24,529 in 1931-32.

The anti-rat campaign and the usual anti-malarial measures were continued. A total of 8,578 vaccinations against smallpox, 50 inoculations against typhoid, 26 against plague and 2,510 against cholera were performed. 231 persons were given anti-rabic treatment at the Ajmer Railway Hospital.

The first-aid training classes held in abeyance last year were resumed and 163 out of 266 candidates obtained certificates; 5 were trained in home nursing. Accident relief medical equipment was provided at many centres and a small first-aid outfit was as usual supplied to passenger guards on the broad gauge.

glutin. Experiments made to estimate the quantity of aluminium taken up from aluminium vessels, by food stuffs cooked in accordance with Indian methods, showed that these vessels offer no danger to health. Considerable progress was made in enforcing the Punjab Pure Food Act of 1929. The chemist of the Public Health Department has been permitted to act as Public Analyst for those municipalities unable to appoint their own qualified analysts.

### United Provinces.

The Prevention of Adulteration Act was in force in all the 85 municipalities, in 21 notified areas, in 9 rural districts and in a number of towns. 4,716 samples were received for analysis; these included 2,777 of *ghee*, 1,327 of milk, 441 of edible oils, 63 of flour, 22 of butter, 8 of vegetable products, 1 of tea and 77 others. Of the total, 934 were certified as adulterated and 3,633 as genuine; the remaining 149 were unfit for examination. Compared with 1927, the percentage of adulterated samples has fallen from 50% to 11% in Agra city and from 39% to 4% in Benares town. The provisions of Butter, *Ghee*, and Fat Licensing Rules of 1930 were in force in 13 localities only.

### Bihar and Orissa.

Of samples examined at the public health laboratory, 57% of *ghee*, 51% of mustard oil, 75% of sweets and 27% of milk were either adulterated or below standard.

### Bengal.

2,818 samples of food were analysed for district boards and 1,404 for municipalities at the Bengal Public Health Laboratory. These included 2,260 and 687 of mustard oil, 342 and 400 of *ghee*, 109 and 102 of *atta*, 70 and 187 of milk and 37 and 37 others. In district board areas, adulteration was detected in 70% of the milk samples, in 53% of mustard oil, in 38% of *ghee* and in 2% of *atta*. From municipal areas, 60% of the milk samples furnished evidence of adulteration; 42% of mustard oil; 27% of *ghee*; and 2% of *atta*.

### Central Provinces.

The Public Health Institute, Nagpur, carried out the analysis of various food stuffs. 15 specimens of butter and 1 of *ghee* were examined. Nearly all of the former were adulterated.

### Madras Presidency.

The Food Adulteration Act was made applicable to Salem municipality and was thus in force in Madras city, in 17 municipalities and in Mettupalaiyam union. Of the 3,441 samples received, 1,437 were adulterated.

### Assam.

The Assam Pure Food Act (Act IV of 1932) was passed and a public analyst appointed. 263 samples of milk, 118 of *ghee*, 117 of mustard oil and 25 of other foods were examined at the public health laboratory, Shillong, and of these 98, 56, 57 and 7 respectively showed adulteration.

Government instructed local bodies to set apart areas for industrial development and not to allow construction of new factories outside these areas. The response to these instructions has been poor. In order to encourage electrical development, Government permitted under certain conditions the installation of electrically-run engines of 15 h. p. and less in factories outside these industrial areas.

### Assam.

Special regulations under the Emigration Act are in force in regard to the supervision of sanitary conditions of tea estates ; sanitation was stated to be generally satisfactory. The A. D. P. Hs. of the Assam Valley and Surma Valley and Hill divisions were appointed *ex-officio* inspectors of mines under Section 4 of the Indian Mines Act, 1923 (Act IV of 1923).

### Central Provinces and Berar.

Sanitation in perennial factories was on the whole satisfactory ; in seasonal factories, water supplies were inadequate. There was no outbreak of epidemic disease. Some of the bigger factories employed medical officers in their own dispensaries. Except in a few cases in outlying areas, lighting and ventilation arrangements were improved. Dust nuisance continued in the ginning factories.

The sanitary condition of the mines was generally satisfactory and water supplies were adequate. The mining camps in every district except Chhindwara were free from epidemics. In the mining camps in Chhindwara, 112 attacks and 7 deaths from influenza, 68 attacks and 8 deaths from smallpox and 5 attacks and 1 death from cholera were recorded. In the labour camps of the Perfect Pottery Company in Jubbulpore district there were 13 cases with 1 death from smallpox, whilst the coal-fields of Chhindwara district recorded high malarial incidence.

### United Provinces.

The district and municipal medical officers of health were *ex-officio* inspectors under the Indian Factories Act.

### Adulteration of Food.

#### North-West Frontier Province.

55. The Punjab Pure Food Act, 1929, and the N.-W. F. P. Pure Food Rules, 1931, are in force but they have not yet been applied to six towns. Of the 81 samples of *ghee* and 28 of milk examined at the provincial laboratory, 29 and 19 were adulterated.

#### Punjab.

A total of 532 samples, including 153 of water, 103 of milk, 78 of *ghee*, 59 of *atta* and 40 of lime, were examined at the public health chemical laboratory. 35% of the water samples were found unfit for drinking purposes and 27% of the samples of milk and 27% of *ghee* were found adulterated. Of the 8 samples of quinine examined, 4 did not contain the declared amount of the drug. Many samples of *atta* were analysed and all showed 8% or more of



by a Shan woman from Lashio ; all cases and contacts were removed to the segregation camp and the entire population at risk was vaccinated. Cases of tuberculosis were isolated.

The sanitary state of the area was satisfactory. Health inspection of school children was carried out and minor defects treated. The maternity and child welfare scheme continued to flourish.

*Mergui and Tavoy Districts.*—In the Mergui district, almost all the rubber estates and mines were closed owing to the slump in the rubber and tin markets. In the Tavoy district, malaria was the most common complaint ; it was stated to be at its worst in the Kalonta mine. The source of drinking water was from wells. In the Kalonta mine, 1 case of smallpox occurred and 350 persons were revaccinated. A sub-assistant surgeon was employed in the Kanbauk mine.

*Thaon District.*—The general sanitation in Kyailto except as regards latrines was reported to be fair ; in Martaban, sanitation was bad, the coolies were housed in small ill-ventilated huts and the water supply was taken from a surface well. In Yinnyein, housing conditions were fair and the water supply was taken from 3 surface wells. In Mayangon, housing conditions and general sanitation were fair ; a few latrines were provided and the water supply was obtained from 2 *pucca* wells.

#### **Bihar and Orissa.**

Among the colliery population of 126,000, 1,942 births and 980 deaths were recorded, giving rates of 15 and 8 p.m. Influenza with 2,932, smallpox with 396 and cholera with 51 cases were the chief causes of sickness. Influenza caused 24 and cholera 11 deaths.

In the whole area, the estimated population was 527,988, the birth rate being 33 p.m. and the death rate 16 p.m. There were 130 suspected cases of cholera with 33 deaths as against 618 and 253 in 1931. Suspected smallpox cases numbered 772 with 20 deaths.

In 5 collieries, water was taken from the Jharia water board supply, whilst 13 water tanks were kept in reserve as a precautionary measure against cholera. Conservancy received attention.

Four maternity and child welfare centres were at work, the staff consisting of 2 health visitors and 5 midwives. Training of indigenous *daïs* received attention.

By a leprosy survey carried out in some of the collieries and villages near Jharia, it was estimated that 3 to 4% of the population were lepers and that the disease was on the increase. An allotment of Rs. 1,600 was sanctioned by the Board for anti-leprosy work. 5 clinics were started at Jharia, Kanta Pahari and Dhanbad ; attendances numbered 963 new and 8,930 old cases.

#### **Madras Presidency.**

Mining operations were continued in the districts of Cuddapah, Kurnool, Nellore, the Nilgiris, Trichinopoly and Vizagapatam. The health of the employees was satisfactory and no epidemics occurred. Health officers inspected 549 factories under the Indian Factories Act. In 1927, the Madras

The National Association of Colliery Managers (Indian branch) dealt with the prevalence of leprosy in the coal-fields and the elimination of female labour from underground workings.

The total number of factories at work was 8,241, perennial 3,802 and seasonal 4,439, and the average number of persons employed fell from 1,431,487 in 1931 to 1,419,711. Women workers numbered 225,632 and children 21,783, these representing 16% and 2% respectively, of the total factory population. Recorded accidents included 162 fatal, 3,513 serious and 14,452 minor. Safety committees have been established in some factories, whilst safety pamphlets were distributed by the factory departments in Bengal and Madras. Noteworthy progress was made with housing schemes in the U. P. The general health of factory employees was reported to be normal and no dislocation of industry occurred from epidemic disease. M. O. Hs. in the U. P. have been appointed additional inspectors of factories and a similar proposal has been made in B. & O. The hazard of lead poisoning in the works of the Burma Corporation received close attention. The cleanliness of factory surroundings was reported to be generally well maintained and sanitary arrangements in the larger concerns were said to be satisfactory. In a number of the larger factories ventilating and cooling arrangements were improved but in the smaller concerns little change can be reported. As was perhaps to be expected, no great expansion of welfare activities occurred and the position as regards crèches remained unchanged. The Kulti Iron Works near Asansol maintained an up-to-date and well-staffed hospital. The Bombay Presidency Baby and Health Week Association held exhibitions in a number of mills in Bombay and Ahmedabad which were attended by over 57,000 workers and their families. Appointment of resident doctors in the new sugar mills in the U. P. is a feature which deserves special mention. Maternity benefits amounting to Rs. 12,394 were paid to 605 women in the C. P. as against Rs. 9,766 to 498 women in 1931.

### Burma.

*Burma Corporation Ltd., Namtu.*—The health of the employees was generally satisfactory. Figures recorded included 2 cases, with 1 death, from anthrax; 3 cases, with 1 death, from blackwater fever; 2 cases of suspected "lead impregnation"; 17 of dysentery; 21 of enteric fever; 2 of typhus fever; 16 of smallpox; 5 of whooping cough; 40, with 17 deaths, of tuberculosis of the lungs; and 17 of epidemic dropsy, all among Indians at Namtu. No cases of cholera or lead poisoning occurred. The source of the anthrax infection was not traced. Anti-larval measures were continued and atabrin was used as a substitute for quinine with satisfactory results. Cholera inoculation of employees and of new entrants in the Company's service was continued and in no case was a severe reaction reported. *Entamoeba histolytica* was found in 8 of the 17 dysentery cases. Of the 21 enteric cases, 13 were diagnosed clinically; in the remaining cases, 4 gave positive widal reactions for *B. typhosus* and 4 for *B. paratyphosus*; the houses, bedding and clothing were disinfected and contacts were inoculated. The typhus cases showed no evidence of pediculosis or tick bite and the source of infection was not traced. An outbreak of smallpox occurred in April, the infection being introduced

in metalliferous mines. Women employed underground numbered 14,711, or 38 % of the total ; these included 14,583 in coal mines ; 128 in salt mines ; 10,761 in open workings ; and 12,835 surface workers. Of the total women employed underground in coal mines, 8,827 were in B. & O., 5,060 in Bengal and 696 in the C. P. ; the rest were employed in the salt mines in the Punjab.

*Bengal and Orissa.*—The general health of persons living within the Raniganj and Jharia Mining Settlements was on the whole satisfactory ; cholera incidence decreased but smallpox increased. In the Asansol Mining Settlements concentrated efforts at vaccination and revaccination, prompt isolation and segregation checked the spread of smallpox. A small outbreak of smallpox occurred at Debour in Chota Nagpur, and a pernicious type of malaria was reported to be on the increase. At the Tata Iron and Steel Company's Noamandi iron mine, the lower incidence of malaria was ascribed to improved sanitation and other anti-malarial measures ; housing conditions were also considerably improved.

*Central Provinces.*—Smallpox prevailed during the hot weather and monsoon periods and caused 63 cases with 6 deaths. The autumn incidence of malaria was in excess of the normal and routine anti-malarial measures including distribution of quinine were carried out. Additional equipment was provided in the main colliery hospitals of the Pench Valley Coal Company and the Amalgamated Coal Fields Company and a nurse was employed for attendance on female workers.

*Punjab.*—The investigation into the incidence of anæmia at Khewra showed that while 50% of the population was slightly affected only 6% presented a serious state of ill-health.

*Burma.*—The anti-malarial measures at Namtu and Bawdwin were successfully continued and the general health conditions in these places and at Tavoy and Mergui were good.

200 persons, 182 men and 18 women, died from accidents and 649 were seriously injured. The fatal injuries included 5 for which the management was at fault and 2 due to faulty material. Figures for accidents among men and women in underground and open workings and on the surface are given in Table IV (vi):—

TABLE IV (vi).

	Total.	Fatal.		Rate p. m. employed.		Serious.	Injured.			Rate p. m. employed.	
		M.	F.	M.	F.						
Underground	138	155	17	1.6	1.2	458	431	34	4.5	2.3	
Open workings	11	14	..	0.5	..	31	26	8	0.9	0.7	
Surface	14	13	1	0.3	0.1	111	107	7	2.7	0.5	

Classes in first-aid were held as usual ; 200 of the 265 persons who attended the 13 centres in the Jharia coal fields and 193 of the 270 trained at the 12 centres in the Raniganj coal fields obtained certificates. First-aid classes were also held at other important mining centres.

in the medical and sanitary exhibition organised by the All-India Medical Licentiates Association and in that organised during the Pushkaram festival at Rajahmundry.

A total of 136,123 lectures and short talks, 14,795 lantern demonstrations and 520 cinema shows were given to audiences totalling about 70 lakhs. In addition, 886 health dramas were performed, 1,189 health exhibitions were held and a number of articles on health subjects were published in newspapers.

In municipal areas, health propaganda received more attention. Government gave a small grant for distribution among *bonâ fide* non-official associations engaged on temperance propaganda.

### Assam.

Except for the distribution of leaflets on tuberculosis and those on leprosy received from the Assam leprosy committee, no serious propaganda work was carried out owing to financial stringency. In the course of his tours, the A. D. P. H. gave health lectures to the students and teachers of a number of schools. The provincial branch of the Indian Red Cross Society has 6 district branches at Sylhet, Cachar, Nowgong, Goalpara, Sibsagar and Lakhimpur.

### Burma.

Members of the health staff gave 4,543 lectures and health talks in rural areas and 412 in urban areas; 158 lantern demonstrations and 24 cinema shows in rural and 37 and 13 respectively in urban areas; and distributed 194,076 copies of health publications.

The hygiene publicity bureau conducted a special propaganda campaign in connexion with a widespread disease known as "*Maw-ka-lam*" in the district of Kyaukse. In towns and villages the publicity staff gave lantern lectures and cinema shows to audiences estimated at 62,000. A total of 64,290 copies of publicity pamphlets were also distributed. A health play on infant welfare was written and acted for the first time at the 'Baby Welcome', Kemmendine. A number of pamphlets were revised and reprinted and the number of these publications issued totalled 409,532.

During the ninth Rangoon health week exhibition the Harcourt Butler Institute of Public Health displayed exhibits dealing with plague, cholera, smallpox, malaria, water supplies, food, conservancy, etc. Interesting features of this exhibition included models and exhibits showing a malarial and non-malarial village, a typical street in Rangoon with its various mosquito breeding places and the work done in a maternity hospital and in an infant welfare centre. In connexion with the exhibition, public health essay and poster competitions were held.

### Industrial Hygiene including Mines.

54. *General.*—During 1932, the daily average number of persons working in and about mines regulated by the Indian Mines Act, 1923, was 204,658 as compared with 230,782 in 1931. Of these 166,351 were men and 38,307 women. 110,907 persons worked underground, 41,017 in open workings and 52,734 on the surface. 148,489 persons were employed in coal mines and 56,169

lectures and lantern demonstrations were also delivered at all important *melas* and at the meetings of the Co-operative Societies, etc., whilst the epidemic doctors carried out propaganda while on duty in rural areas.

The Red Cross health museum is under the direct control of the D. P. H.; a model illustrating an insanitary village was added during the year.

### **Bengal.**

Despite financial stringency, the popular demand for publicity work led the government to increase the staff from 5 to 12 units; each unit includes a lecturer, an operator and an assistant with a portable cinema outfit. Nearly 1,300 health shows and lectures were delivered to audiences totalling approximately 18 lakhs. A film 9,200 ft. in length entitled " Village Reconstruction, series II " was produced; posters, leaflets and charts were distributed as usual.

### **Central Provinces and Berar.**

The two health publicity officers visited 82 centres, delivered 183 lectures and assisted with anti-cholera inoculations during cholera epidemics. The epidemic and dispensary staffs also delivered lectures in their respective areas. The publicity officers assisted in organising such baby shows as were held in a few centres.

### **Bombay Presidency.**

Useful health propaganda connected chiefly with maternity and child welfare was carried out by the 17 sanitary associations at work in this province. A health and baby week was celebrated in many urban centres.

In the *Central Registration District*, the Bombay Presidency Baby and Health Week Association arranged a health campaign in 4 centres in Poona district; lantern and cinema shows were also organised at the headquarters of the Poona Seva Sadan Society, the Indian Military Hospital, Ghorpori, and the Rural Uplift Centre, Hadapsar. In the *Southern Registration District* the A. D. P. H. supervised the health section of the agricultural exhibition and cattle show at Pandharpur. In the *Northern Registration District* a series of films on epidemics, marriage, child welfare, etc., was exhibited at the baby week show arranged by the agent of Khandesh mill for his workers and by the *Arogya Mandal* for the general public at Jalgaon.

### **Madras Presidency.**

In a number of districts portable cinemas are now available, whilst suitable health films are stocked in the propaganda section of the Public Health Department and are issued on hire to local bodies and voluntary associations. A film on cholera entitled " The man who was afraid " was made during the year and another film on leprosy was under preparation. Three new sets of lantern slides on child welfare and tuberculosis were prepared and a " puppet show " as a means for propaganda was also introduced. 15 lithographic colour posters were issued, 10 dealing with cholera, 2 with malaria, and 1 each with water supply, rural sanitation and anti-rabic treatment. The health week was celebrated as usual. The Public Health Department participated

### United Provinces of Agra and Oudh.

The hygiene publicity bureau, financed partly by the local government, by the Indian Red Cross Society and by the local bodies to the extent of Rs. 7,050 continued to carry out health propaganda by means of lantern lectures, posters and cinema films in both towns and villages. The bureau is also the medium for co-ordinating health publicity with the educational propaganda conducted by other agencies and by departments of government such as the St. John Ambulance Association, the *Sewa Samiti*, the Servants of India Society, the agricultural and co-operative departments and the school health service. The material for health education work was as usual provided by the provincial branch of the Indian Red Cross Society. The officers of the bureau gave radio talks from the Lucknow University broadcasting station, organised health exhibitions and delivered lectures at fairs and festivals, whilst cinema shows were held in several cantonments. The cinema van, equipped with health films, models, posters and a wireless receiving set, was used extensively in roadside villages; 153 demonstrations were given to audiences numbering over 2½ lakhs. The St. John Ambulance first-aid course was given to students of the sanitary inspectors' class and to the women employees of the Co-operative Department and others. Technical lectures were given during the post-graduate and licentiate courses for M. O. Hs. and to the D. P. H., L. P. H., L. M. D., and health visitors' classes. Lectures on the work of the Public Health Department and on other health subjects were also given to school teachers attending the annual courses in physical instruction. The village-aid scheme made progress.

The Junior Red Cross movement was conducted by district and municipal M. O. Hs. and school medical officers under the guidance of the officers of the Bureau and in accordance with the policy of the central Red Cross Organization. The number of groups increased from 517 to 1,049 and the membership from 15,237 to 29,292. Special stress was laid on the practice of health habits, and health dramas were acted in large numbers in vernacular schools. In order to encourage the teaching of first-aid to the injured, 31 sets of appliances were distributed.

In order to demonstrate the value of intensive health measures and to create the demand for better sanitation, a health unit was started in the district of Partabgarh covering an area of 60 square miles. The International Health Board of the Rockefeller Foundation will meet half the cost of the unit in the first year, one-third in the second year and one-quarter in the third.

### Bihar and Orissa.

The public health bureau conducted the usual propaganda work, issued pamphlets and posters to local bodies and published health articles in newspapers. The A. D. P. Hs. carried lanterns and sets of slides while on tour and delivered lectures on health subjects. The A. D. P. H., South Bihar Circle, organised at the provincial Co-operative Federation Congress held at Monghyr an exhibition of posters on child welfare, cleanliness, cholera, smallpox, etc., and gave lantern demonstrations on public health subjects; regularly organised

and was scheduled from 5th November, 1931, to 20th January, 1932; from 25th June to 28th November, 1932; and from 2nd February to 25th July, 1933.

Similar gatherings in other Registration Districts passed off smoothly.

### **Madras Presidency.**

Most of the 585 festivals celebrated occurred during the first half of the year and all passed off smoothly. District health officers were as usual responsible for the important festivals, the smaller gatherings being supervised by health inspectors. Those held within municipal areas were controlled by the municipal authorities. Cholera bacteriophage was distributed at the Godavari Pushkaram, at Bhadrachalam during the Sri Rama Navami, at Tiruvannamalai during the Krithigai festival, at Nagore during the Kanduri, and at Chidambarum during the Arudra Darsanam festival. It was also used in those festival centres on the Cauvery river known by experience to be endemic foci for cholera. Generally, local bodies satisfactorily carried out recommendations made by the Public Health Department but in the districts of Ganjam, Tinnevely and Guntur the sanitary arrangements were inadequate. Local bodies are reported to be taking advantage of the provisions of Section 128 of the Local Boards Act and Section 157 of the District Municipalities Act for the levy of contributions from temple authorities towards the cost of sanitary arrangements during festivals. In view of the difficulties experienced in the recovery of contributions levied on temples, an amendment to the Hindu Religious Endowments Act was suggested.

The most notable event of the year was the Godavari Pushkaram fair, which occurs every twelfth year and which was celebrated during 20 days of July, 1932, at Rajahmundry and in a number of subsidiary centres in the districts of East and West Godavari. Special committees were formed for the organization of necessary sanitary arrangements. On this occasion the festival, which has in the past been frequently associated with widespread outbreaks of cholera, passed off uneventfully, but this was apparently due in the main to the freedom of the greater part of the province from cholera for several months before the festival occurred, a unique experience in the history of the province.

### **Assam.**

No important *mela* was celebrated in this province, but the few small fairs which were held passed off uneventfully.

### **Health Propaganda.**

#### **Punjab.**

53. No whole-time publicity officer was employed, but the district M. O. Hs. delivered 5,089 health lectures to the general public, in schools and at fairs. Health pamphlets, posters and dramas were issued and 180 lantern slides were prepared for departmental use.

50,000 coming by rail and 20,000 by road. The staff deputed by the Public Health Department included 3 M. O. Hs. and 3 sub-assistant surgeons whilst a M. O. H. was appointed temporarily by the Puri municipality. Wells were cleaned and disinfected periodically before the fair opened and treated with cholera bacteriophage during the festival. All water tanks were treated with chlorinated lime as frequently as possible. The staff of the provincial publicity bureau gave lantern demonstrations. Anti-cholera inoculations numbered 35,598 as compared with 34,226 in 1931 and bacteriophage was administered to all contacts. 51 cholera cases with 7 deaths were recorded at the *snan jatra* festival but the car and return car festivals remained free of this disease.

The Pitripaksh *mela* at Gaya, held from 14th to 30th September, 1932, was attended by 63,668 pilgrims. Except for 2 cholera cases with 1 death, this festival passed off uneventfully. During the Sonapur cattle fair, which lasted for a fortnight from 9th November and is said to be the biggest fair of its kind in the world, no cholera or other infectious disease was reported although an important bathing ceremony takes place which is attended by thousands of pilgrims.

### Bengal.

Except for 3 non-fatal cases of cholera at the Ganga Sagar *mela* in the 24-Parganas district, the Nangabundh *mela* in the Dacca district and the Dhaldigri fair in the Dinajpur district, all the fairs passed off uneventfully.

### Central Provinces and Berar.

Out of a total of 118 fairs, 70 were attended by the epidemic dispensary staff and the others by assistant medical officers. No epidemic disease was reported. Sources of water supplies in the festival areas and on the roads leading to these were permanganated. Isolation huts were provided and all food stuffs were examined. The assistant medical officers and the health publicity officer delivered lectures on health subjects.

For the *Sinhasta* fair at Nasik and Trimbak, a 12-yearly event which is held at 3 different periods, assistant medical officers were placed on duty at Nagpur, Jubbulpore, Itarsi and Khandwa railway stations. Intensive propaganda was carried out in rural areas advising intending pilgrims to be inoculated against cholera; all drinking water supplies on the roads leading to railway stations were disinfected.

### Bombay Presidency.

*Central Registration District.*—During the Ashadi fair at Pandharpur, which was held in July and was attended by over 143,000 pilgrims, 2 cases of cholera with 1 death were treated in the infectious diseases hospital.

*Western Registration District.*—The principal fairs at Nasik and Trimbak were *Nivrutti* in January, the *Mahashivaratra* in February, the *Ram Navami* in March and the *Kartiki* in November. Attendances ranged between 2,000 at the *Kartiki* fair and 25,000 at the *Nivrutti* fair. Minor outbreaks of cholera and plague were reported at Nasik and Trimbak during the *Sinhasta* fair, which is held every twelfth year. This fair ordinarily lasts for 13 months



### Punjab.

As usual sanitary arrangements at all the important religious and cattle fairs were organised and supervised by the District M. O. Hs. but the A. D. P. Hs. themselves supervised the largest gatherings. After continued pressure, local bodies have now agreed to construct permanent latrines, urinals and incinerators. No deaths from cholera were reported. Sanitary measures included protection and disinfection of water supplies, inspection of food stuffs, incineration of night soil, provision of isolation huts for segregation and treatment of infectious cases and public health propaganda.

### Delhi.

None of the fairs are large enough to require special mention but all passed off uneventfully.

### United Provinces of Agra and Oudh.

In those districts where a district health staff is organised, that staff is responsible for the medical and sanitary arrangements of all fairs and religious gatherings held there. At larger gatherings, e.g., the *Sawan Jhula* fair at Fyzabad-Ajodhya, the lunar eclipse fair at Benares, the *Shah Kumber Devi* fair at Saharanpur, the *Piran-i-Kaliar* fair, etc., the Range A. D. P. Hs. are responsible. The officers of the hygiene publicity bureau gave lantern and cinema health demonstrations at all large fairs and *melas*.

Most of the fairs, including the important *Magh Mela* at Allahabad and the *Dadri* fair at Ballia, presented a clean bill of health. At the *Sawan Jhula* fair (Ajodhya), 20 cases of cholera were imported from one or other district in the province and one from Chapra in Bihar. Two cases of cholera were reported at the Dhaighat fair in Shahjahanpur and 1 at the *Ram Navami* fair, Ajodhya. Four cases of smallpox with 1 death and 34 cases of plague with 24 deaths were recorded at the Dikhauti fair, Hardwar; the *Kurri Sudauli* and the Kartiki fairs in the district of Rae Bareilly reported 1 imported case of cholera each. All necessary anti-epidemic measures were taken in each case and no spread of infection occurred.

Inspection of passengers was continued at the border and at railway stations and the temporary regulations under the Epidemic Diseases Act were enforced where necessary.

### Bihar and Orissa.

Whilst the sacred Hindu towns of Gaya and Puri attract pilgrims throughout the year, in the former the numbers reach their maximum during the September Pitripaksh *mela* and in the latter during the *dhol jatra*, the *snan jatra* and the *rath jatra*. Other important *melas* include the Sonapur cattle fair, the *Shivaratri* fair at Deoghar, *melas* at Hijla in the Santal Parganas and the Singheswar *mela* in Bhagalpur district. The A. D. P. Hs. visited these fairs and assisted the local authorities with the medical and sanitary arrangements. Epidemic doctors were detailed for duty where necessary.

The *snan*, car and return car festivals were held at Puri on 18th June and on 5th and 13th July and were attended by nearly 70,000 persons, about

carried out owing to want of staff. As the health standard of school children is by no means ideal, the D. P. H. has urged the entertainment of at least 2 assistant surgeons and 1 woman doctor to carry out annual inspections in each school.

The A. D. P. H., Surma Valley and Hill Division, inspected the hygienic condition of the schools within his jurisdiction. He delivered health lectures to both students and teachers and made recommendations regarding sites, ventilation, latrines and urinals and the vaccinal state of scholars. In Kamrup, Assam Valley Division, the dispensary medical officers made periodical inspections of selected institutions.

### Burma.

The scheme for medical inspection of schools suffered a great setback owing to the suspension of grants-in-aid which Government had given since 1922. Health reports were available in respect of 68 schools only as against 176 in 1931 and of 17,524 pupils on their rolls, 16,199 or 92% were examined. 58% were reported to be vaccinated; 39% revaccinated; 2% had had small-pox; and 1% were unprotected. Common defects were defective teeth 19%, enlarged tonsils 12%, defective vision 6%, skin diseases 5%, anæmia 4% and trachoma 3%. Dental caries was most common among the juniors and kindergarten pupils. During epidemics, the inspecting staffs carried out anti-cholera, anti-plague and T. A. B. inoculations. In the Government Normal School, Mandalay, a threatened outbreak of beri-beri was averted by the prompt measures adopted by the M. O. S. The rural health unit in Hlegu provided the Anglo-Vernacular Middle School with a large drum, fitted with a spigot. 200 numbered individual aluminium cups were also supplied and when not in use these are kept in similarly numbered compartments in a wooden cabinet. This practical demonstration of personal and water hygiene is a valuable step in the right direction.

The sanitary condition of school buildings, including water supply and conservancy, was reported to be generally good. The advice of the Public Health Department was sought in respect of the plans of school buildings.

### Fairs and Festivals.

52. *General.*—The attention of the Government of India has been drawn recently to certain defects in co-ordination between British Provinces and Indian States in regard to the control of spread of infection by pilgrims attending *melas* and fairs in the latter areas. In order to overcome these defects, the authorities of many of the Indian States have already agreed to co-operate with the Public Health Departments in British Provinces by supplying through the Central Government particulars in regard to (a) the date and duration of these fairs, (b) the average attendance expected, (c) the arrangements made for medical inspection of pilgrims at State borders and (d) such other information as would permit of suitable and timely measures being taken by British provinces for the prevention of importation of epidemic disease. For the present, these arrangements will be confined to the larger gatherings only, but it is to be hoped that experience will show the desirability of extending them even to the smaller *melas* and fairs, as these are frequently the more dangerous because of their less satisfactory sanitary arrangements and control.

**Bengal.**

The 40 medical officers inspected 20,322 boys and 1,204 girls in 189 schools. Of the 21,018 scholars whose physical condition was reported on, 5,522 or 26% were ill-nourished; 4,288 or 21% were badly clothed; 5,442 or 27% were bare-footed; 3,592 or about 17% had skin disease, chiefly ringworm or scabies; 1,879 or 9% had defective teeth; 484 had nasal disease, chiefly rhinitis. Other defects included enlarged tonsils 2,993 or 14%; adenoids 356; enlarged lymphatic glands 1,220 or 6%; ear disease, chiefly otorrhoea, 266; respiratory diseases 303; defective speech, mostly stammering, 161; eye troubles 2,783 or 13%; and infectious disease 954. The unvaccinated numbered 481. In Calcutta the dental college and hospital at Bowbazar, continued to treat cases free; and the refraction of those with defective vision was carried out in the refraction room of the eye hospital of the Medical College.

In height the pupils compared favourably with the anthropometric standard but the average weight was much less than normal. For detailed figures the annual report of the D. P. H. should be referred to.

Of the 189 schools examined, 46 had inadequate floor space, 43 were ill-ventilated, 48 had neither privies nor urinals.

86,310 pupils in 2,730 schools were examined by the rural sanitary inspectors in 22 districts. Of these 4,072 were unvaccinated and 16,802 had enlarged spleen. 5,131 were inoculated against cholera; 8,503 were treated with quinine; and 15,500 were vaccinated.

**Central Provinces and Berar.**

The assistant medical officers in charge of urban dispensaries examined about 85,000 boys and 15,000 girls each month. Of these 332 children were found unvaccinated, 1,080 had enlarged spleen, and 2,263 had contagious or other disease. The epidemic dispensary staff inspected 65,847 pupils in rural schools; of these 768 were unvaccinated; 1,752 had enlarged spleen; and 1,702 had contagious or other disease. Unprotected children were vaccinated and those suffering from enlarged spleen and contagious disease were treated in hospitals and dispensaries.

**Bombay Presidency.**

The scheme of medical inspectors of schools, sanctioned in 1920, was discontinued in 1922 owing to financial stringency and has not been revived. During 1932, in 148 schools inspected in Sind by the inspectors of sanitation and vaccination 5,593 children were found to have enlarged spleen.

**Madras Presidency.**

The medical inspection of schools remained in abeyance owing to financial stringency.

**Assam.**

Although there are 67 high schools, 444 middle schools and 5,891 primary institutions with nearly 340,795 scholars, inspection is not systematically

5% enlarged tonsils, 3% skin diseases, 2% pyorrhoea, 2% defective vision and the remaining 68% showed other defects. Four cases of leprosy in scholars and 1 in a teacher were detected, as also a few cases of goitre, hydrocele, hernia, elephantiasis, stone in bladder, paralysis, venereal disease, epilepsy and mental aberration. In Agra, abnormal cases of dextrocardia, congenital heart and transposition of liver were also reported.

Of the pupils examined, 14 % in the larger towns and 20% in rural areas were reported to be ill-nourished.

In order to discourage resort to street vendors of food of questionable purity, supplies of germinating gram were provided during recess intervals to as many district and town schools as possible and this is reported to have given satisfactory results. No fewer than 23,000 boys were vaccinated by the school medical officers in the larger towns.

Although the grant for cinchonisation of school children in 150 schools in Sitapur district was discontinued in 1931, the school medical officers, encouraged by the favourable results obtained in previous years, were able to extend the distribution to 45 schools as compared with 12 in 1931. A school clinic with a central school dispensary was opened in Cawnpore, the municipal board meeting the cost of the drugs and of a compounder. This clinic is not merely a means of distributing medicines but provides expert treatment, *e.g.*, eyesight is tested. In Agra, such clinics are at work in different localities on different days. Dental treatment was provided in Jhansi and Gorakhpur. Borehole latrines were being provided for schools in the health unit area in Partabgarh.

The number of Junior Red Cross groups rose from 517 in 1931 to 1,049, and the total membership exceeded 29,000. Challenge cups were given for outdoor games and first-aid in Unao and Bahraich. First-aid lectures were given by the M. O. Ss. of Allahabad, Benares, Bareilly, Fyzabad, Jhansi and Hapur and by those of the districts of Mirzapur, Kheri, Fyzabad, Bahraich and Sultanpur. The M. O. Ss. and the Assistant Hygiene Publicity Officer also gave lectures to the physical training classes for teachers.

### **Bihar and Orissa.**

Medical inspection of school children was in force in all the high and middle schools, and one school medical officer with an assistant worked in each of the 5 divisions of the province, whilst a woman school medical officer was employed for girls' schools. These officers not only inspected the scholars but gave lectures on hygiene and reported on school buildings. Of 10,318 children examined, 6,474 were found to have defects. The woman medical officer examined 483 children, of whom 67% were found to have physical defects.

The chief defects noted were carious teeth, skin diseases, enlarged tonsils, defective vision and heart affections. A few cases of early tuberculosis and leprosy were also detected. Attendance at hygiene lectures is compulsory but the subject is not considered of any importance as it is neither compulsory nor optional in the matriculation examination. During the school vacation, the medical officers lectured on hygiene to primary school teachers,

Of the boys examined, 27% were found to have eye diseases. As regards diseases of the teeth and throat, in rural schools diseased tonsils were 9% as compared with 7% in urban schools, the corresponding rates for defective teeth being 6% and 12%. Among girls, diseases of the tonsils were found in 19% of those examined, urban 22% and rural 5%. Diseases of the eyes and teeth were each 6%, urban and rural rates for the former being 5% and 13% respectively. The corresponding figures for diseases of the tonsils were 22% and 5%.

In Delhi city many boys and girls on the advice of the school medical staff sought treatment at the civil hospital, at out-door dispensaries or from private practitioners. In urban areas, of 1,520 boys and 137 girls recommended by teachers, 1,464 and 56 were treated for uncleanness and in rural areas of 965 boys and 59 girls, 500 and 8 for minor ailments. In urban areas, 9,320 boys and 1,020 girls and 4,175 boys and 197 girls in rural areas were recommended for medical care and 4,321 and 66 and 2,558 and 121, respectively, received treatment; 1,329 boys and 77 girls in urban areas were treated by private practitioners. In urban areas, 1,188 boys and 190 girls and 240 boys and 34 girls in rural areas were vaccinated or revaccinated out of 1,529 boys and 872 girls in urban areas and 612 boys and 41 girls in rural areas who were found unprotected.

The M. O. S. and his assistants lectured at various centres on health subjects and training in first-aid was provided in one school.

### United Provinces of Agra and Oudh.

The 13 whole-time M. O. Ss. carried out detailed inspection in all the 142 English schools and ordinary inspections in 232 out of 495 other schools. The 33 *ex-officio* M. O. Ss. in smaller municipalities conducted detailed inspections in 88 of the 89 English schools and routine inspections in 208 out of 278. The *ex-officio* M. O. Ss. in 20 districts carried out detailed inspections in all the 13 English schools and routine examinations in 1,334 out of 7,274 institutions. Table IV (v) gives the numbers of pupils examined :—

TABLE IV (v).

	Detailed inspection.			Routine inspection.		
	On roll.	Examined.	Per cent. examined.	On roll.	Examined.	Per cent. examined.
Larger Meeties.	46,559	24,197	58	58,751	16,204	28
Smaller Meeties.	26,604	13,598	51	31,334	14,403	46
Districts . . .	3,182	1,680	55	448,067	71,811	16

In addition, 636 girls in 5 schools in Allahabad and 73 in a school in Lucknow were examined. A scheme for the medical inspection of girls was under preparation in consultation with the Chief Inspectress of Schools.

In urban areas, 16% of the children examined were found to have enlarged tonsils, 12% defective vision, 13% defective teeth, 9% diseases of the eyelids, 6% pyorrhoea, 3% skin diseases and the remaining 40% had other defects. In rural areas, 11% had dental caries, 9% diseases of the eye and eyelids

boys and 3,687 girls were medically examined out of totals of 37,074 and 4,911 on the rolls. Table IV (*iii*) gives details :—

TABLE IV (*iii*).

	Boys.	Per cent of exmd.	Girls.	Per cent of exmd.
Total . . .	24,013	75.3	2,709	73.5
Defective vision	2,889	9.1	56	1.5
Trachoma . . .	5,786	18.1	181	4.9
Diseases of skin	280	0.9	36	1.0
Diseases of teeth	3,146		214	5.8
Diseases of throat	2,641	8.3	62	1.7
Enlarged tonsils	2,428	7.6	695	18.8
Diseases of nose	37	0.1	17	0.5
Diseases of ear	118	0.4	12	0.3
Diseases of glands	586	1.8	28	0.8
Diseases of lungs	16		56	1.5
Other diseases .	528	1.7	109	3.0
Malaria . . .	1,036	3.3	25	0.7
Unvaccinated . . . . .	874	2.7	105	2.8
Not revaccinated . . . . .	1,267	4.0	808	21.9
Debility . . . . .	46	0.1	183	5.0
Uncleanliness . . . . .	2,335	7.3	122	3.3

In urban areas, of 23,002 boys in 119 schools, 20,446 were examined; 1,445 had defective vision in both eyes and 279 in one eye. Of 3,102 girls examined, 1,157 were recommended for treatment. Table IV (*iv*) gives interesting figures :—

TABLE IV (*iv*).

	Boys.				Girls.			
	Urban.		Rural.		Urban.		Rural.	
	Defec- tives.	Per cent of exmd.	Defec- tives.	Per cent of exmd.	Defec- tives.	Per cent of exmd.	Defec- tives.	Per cent of exmd.
Total . . . . .	15,633	76.4	8,401	73.3	2,333	75.2	333	56.9
Defective vision . . . . .	1,766	8.6	1,123	9.8	45	1.5	11	1.9
Trachoma . . . . .	3,732	18.3	2,054	17.9	116	3.7	65	11.1
Skin diseases . . . . .	36	0.2	244	2.1	23	0.7	13	2.2
Diseases of teeth . . . . .	2,433	11.9	713	6.2	186	6.0	28	4.8
Diseases of throat . . . . .	2,097	10.3	544	4.7	5	0.2	57	9.7
Enlarged tonsils . . . . .	1,354	6.6	1,074	9.4	695	22.4	30	5.1
Diseases of nose . . . . .	7	...	30	0.3	14	0.5	3	0.5
Diseases of ear . . . . .	62	0.3	56	0.5	7	0.2	5	0.9
Diseases of glands . . . . .	499	2.4	87	0.8	14	0.4	14	2.4
Diseases of lungs . . . . .	..	..	16	0.1	53	1.7	3	0.5
Other diseases . . . . .	407	2.0	121	1.0	104	3.4	5	0.9
Malaria . . . . .	273	1.3	763	6.7	17	0.6	8	1.4
Not revaccinated . . . . .	1,006	4.9	351	3.1	794	25.6	27	4.6
Unvaccinated . . . . .	523	2.6	261	2.3	78	2.5	14	2.4
Debility . . . . .	46	0.2	21	0.2	110	3.5	..	..
Uncleanliness . . . . .	1,392	6.8	943	8.2	72	2.3	50	8.5

tion terminates in March, 1934, the local government has decided to continue the work as far as funds permit.

*The Harcourt Butler Institute of Public Health, Rangoon.*—The work of this institute was as usual carried out in 4 sections. The plague section completed its investigation into rat and rat-flea conditions on barges, lighters and ocean-going steamers. The malaria bureau made preliminary surveys in a number of towns and villages and gave courses of instruction for the Licentiate in Hygiene and for health inspectors. The course of instruction which previously consisted of lectures, field demonstrations and laboratory work in regard to anopheline mosquitoes, malaria, the culicines, dengue, filariasis and yellow fever was extended to include the common housefly, the flea, the tick and the sandfly.

### Medical Inspection of Schools and Colleges.

#### North-West Frontier Province.

51. Medical inspection of school children was continued in the municipalities of Peshawar, Bannu and D. I. Khan. In Abbotabad and Kohat, part-time medical officers were employed, but details of their work are not available. A total of 30,717 children were examined between July, 1931, and June, 1932, and of 9,690 with defects, 7,241 sought treatment. 2,747 children had dental disease, 2,462 external eye disease, 2,377 enlarged tonsils, 1,906 enlarged spleen, 1,594 defective vision, 1,124 affections of the glands, 1,006 malaria, 851 ear, nose and throat complaints, 614 respiratory diseases, 523 nutritional diseases, 455 alimentary diseases, 454 anæmia, 429 adenoids, 373 general debility, 276 misshapen chest, 123 skin diseases and 389 other causes; 229 were mouth breathers, 204 unvaccinated and 2,547 were unclean. 32 cases of tuberculosis were reported including 14 with tuberculosis of the lungs, 12 with tubercular glands in the neck and 3 with tubercular axillary glands.

#### Punjab.

The experimental scheme of medical inspection of school children continued in the rural districts of Gurgaon, Jullundur, Sialkot, Sargodha and Multan. The evolution of an improved scheme was under consideration.

#### Delhi Province.

The medical inspection staff for urban areas comprised one assistant surgeon supervisor, who also acted as a part-time supervisor for rural areas, and 2 male and 3 female sub-assistant surgeons, one of the latter being part-time. For rural areas, 5 dispensary sub-assistant surgeons carried out examinations in addition to their dispensary work. As far as possible all school children and buildings are examined twice a year. Accommodation, lighting and ventilation were generally satisfactory. Water supplies for urban schools were satisfactory; the wells used for rural schools were permanganated frequently. Playgrounds were available in nearly all rural institutions but only in a few urban schools.

In 21 high schools, 53 middle schools and 201 primary schools, of which 2 high schools, 13 middle schools, and 52 primary schools were for girls, 31,899

Table IV (ii) gives details of the health staffs employed by local bodies.

TABLE IV (ii).

	1st Class.	2nd Class.	Health Officers.			Medical regis- trars.	Health inspec- tors.	Inspec- tors of vacci- nation.	Vacci- nators.	Health Visitors.
			Part- time.	Co- opted.	Asstt.					
Total .	30	13	11	89	51	20	183	40	404	
URBAN.										
Rangoon Corporation .	1					13	39		25	
Municipalities, over 20,000.	14			6		7	30		24	
Municipalities, 10,000—20,000.	12			11			12		12	
Municipalities under 10,000.	31			20			27		27	
Notified areas .	19			16			12		11	
RURAL.										
District Councils .	28			17			42	29		
Deputy Commissioners' Local Fund.	22			8			4		53	
Excluded (Shan States).	2			2					41	
Provincial Fund (Chin Hills).	1									
SPECIAL.										
Burma railways .										
Burma Corporation, Namtu.										
Oil Fields, Yenangyaung										
Oil Fields, Singu .										
B. O. C. Refinery, Syriam.										
Port Commissioners, Rangoon.										
Hlegu Health Unit (Insein).										

*The Hlegu Health Unit.*—Since the inception of this health unit in 1929, the scope of its activities has gradually extended. Important additions during 1932 included the establishment of an ante-natal clinic and an anti-leprosy clinic. Of the 372 cases of communicable disease reported during the year, 91 were smallpox. Infection was introduced from Rangoon and eventually the disease became widely distributed through Hlegu whilst sporadic outbreaks occurred in two other areas. 12,898 vaccinations were performed but nearly 10 % of the population is said to be still unprotected. Health education was carried out by means of personal contacts, group conferences, lectures, lantern and school talks, cinema shows and by the issue of the "Hlegu Health News". In order to develop health habits in schools, the unit supplied 5 institutions with individual drinking cups, cup racks and water barrels. The second annual health and sports exhibition was held. 207 houses in 6 villages were surveyed and 11,804 inspections of wells, tanks, latrines, eating shops, meat, fish and vegetable stalls, cowsheds, slaughter houses and commercial premises were made. In the larger villages, marked improvement was noticeable in environmental sanitation and in the development of sanitary methods for the protection of food and water supplies and for the proper disposal of refuse and sewage. Practical training was given to 25 students of the health inspectors' class; 39 students of the Medical School also visited the unit. A first-aid class was held, 6 students obtaining certificates. Although the present arrangement with the Rockefeller Founda-



tion until the new constitutional reforms have been introduced. Continued attention was given to the rural sanitation campaign, which is directed towards the evolution of a cheap type of village latrine and the prevention of soil pollution. The field staff consisted of 6 rural sanitation units and 2 school units but the latter were abolished as a measure of economy. The former were at work at the close of the year in the districts of Madura, Coimbatore, Salem, South Arcot, Kistna and Vizagapatam. These units were mainly engaged in (a) an intensive educational campaign against hookworm and soil pollution; (b) the mass treatment of hookworm infection in school children; and (c) the provision of village latrines.

### Assam.

The D. P. H. has the assistance of 2 A. D. P. Hs., one for the Surma Valley and Hill Division and the other for the Assam Valley Division. Other health personnel included 11 urban health officers, of which only one was fully qualified, 7 assistant surgeons, 101 sub-asstt. surgeons and 39 inspectors of vaccination.

### Burma.

The headquarter staff consisted of a D. P. H. and 2 A. D. P. Hs. Although, by the Burma Rural Self-Government Act of 1921, District councils were made responsible for the improvement of sanitation and for public health in general including the prevention of disease, whole-time district health officers were employed only in the 3 districts of Akyab, Myaungmya and Pyapon and only 5 assistant district health officers were sanctioned. In other districts, the civil surgeons were expected to act as part-time health officers. In areas outside the jurisdiction of district councils, the Deputy Commissioners employed other health staffs.

Including Rangoon, only 9 out of 15 towns, having a population of over 20,000 employed whole-time health officers; of the smaller municipalities Thayetmyo and Nyaunglebin continued to employ second class health officers while Paungde appointed a similar officer from May, 1932. Government contributed in each case about Rs. 500 towards the salaries of the health officers in Henzada, Prome, Pegu, Nyaunglebin and Thayetmyo. For towns with a population under 10,000, consideration was being given to the proposal to appoint the sub-assistant surgeons in the local hospitals or dispensaries as part-time health officers. Of the 22 permanent sub-assistant surgeons sanctioned for the Public Health Department, only 19 were actually employed on epidemic and general sanitary duties. The total number of health inspectors employed during the year was 183, of whom 120 worked in towns, 46 in rural areas and 17 on the railways, with the Burma Corporation at Nanttu, etc. Five district councils and 8 municipal and town committees in contravention of section 34D. of the Burma Municipal Act failed to employ health inspectors. The course for the Licence in Hygiene was resumed after being suspended for a year.

### Bombay Presidency.

Consequent on the abolition of the Western Registration District from May, 1932, the number of A. D. P. Hs. was reduced from 5 to 4. These officers visited 734 towns and villages and during their tours also inspected various dispensaries, schools, police lines, factories and proposed sites for government buildings. They also gave lecture courses in hygiene and public health at the Medical Schools of Poona, Ahmedabad and Hyderabad (Sind). The D. P. H. visited 56 towns and villages in connection with epidemics, water supplies, drainage and general sanitation.

Out of 154 municipalities, qualified M. O. Hs. were employed only in Karachi, Hyderabad, Ahmedabad, Surat, Poona and Sholapur. Medical Officers holding a degree of Bombay University, the sanitary inspectors' certificate and the B. Hy. (Bombay), were employed at Broach, Bandra, Ahmednagar and Bijapur. Medical Officers with health qualifications suitable for a first class town were employed in Shikarpur and Sukkur; whilst those with qualifications suitable for a second class town were at work in Nasik, Jalgaon and Dhulia. The towns of Nadiad and Dakore employed L. C. P. Ss. holding sanitary inspectors' certificates. 96 qualified sanitary inspectors were employed in 47 towns, 15 of the total working in Ahmedabad. Of 123 students who appeared for the sanitary inspector's examination, 46 passed and received certificates from the Royal Sanitary Institute. One of the 8 medical men who appeared qualified for the post of M. O. H. of a second class town.

District Health Officers were employed only in the three districts of Satara, Dharwar and Larkana. Useful work was done by 551 sanitary committees and village *panchayats* and 17 sanitary associations.

The Poona and Karachi public health laboratories carried out the analysis of large numbers of water samples and the Poona municipal laboratory did various pathological and bacteriological examinations.

### Madras Presidency.

The cadre of the Public Health Department in addition to the D. P. H. includes 5 A. D. P. Hs., 55 health officers of the first class and 48 of the second class, 285 health inspectors, 42 government vaccinators, 815 vaccinators employed by local bodies and 2 compounders. Retrenchment resulted in the amalgamation of the posts of rural sanitation officer and propaganda officer, the abolition of 2 school units in the hookworm campaign and the substitution of the special malaria officer by a first class health officer trained in anti-malarial work. The 6 temporary posts of assistant district health officers were sanctioned for a further year. In order to improve co-ordination in health work, it was decided to hold group conferences for health officers in 6 circles throughout the Presidency.

The codification into a single Act of all existing enactments relating to public health administration has engaged the attention of the provincial authorities for some time but it has now been decided to postpone this ques-

officer and in Monghyr a sub-assistant surgeon was appointed. The question of appointing licentiates with suitable public health qualifications as health officers in the smaller municipalities was under consideration.

The public health laboratory continued to carry out its chemical and bacteriological work.

### Bengal.

Three A. D. P. Hs. were each in charge of Burdwan, Presidency and Dacca circles. One A. D. P. H. was in charge of school hygiene. 21 health officers and 99 sanitary inspectors were employed in municipalities excluding Calcutta as against sanctioned cadres of 21 and 100 respectively. The Santipur municipality continued to be without a sanitary inspector.

Except Darjeeling, every rural district has a fully qualified health officer. The rural public health organisations referred to in previous reports continued to work satisfactorily in 25 districts although no improvement was effected in the registration of vital statistics and the reporting of epidemics.

The Bengal Public Health Laboratory continued to carry out chemical and bacteriological examinations and to examine food samples. Researches included work on the "faecal flora of Bengal as an indicator of sewage contamination of water" and on the vitamin value of *kacha ghee*.

### Central Provinces and Berar.

The expenditure on public health administration aggregated Rs. 2,93,424 in 1932-33 as compared with Rs. 3,99,394 in the previous year. Government grants amounting to Rs. 12,045 were made to some municipalities to meet half the pay of their health officers and sanitary inspectors.

The amalgamation of the posts of I. G. C. H. and D. P. H. was sanctioned temporarily owing to financial stringency and this unfortunate retrenchment was accompanied by cessation of other public health developments. The scheme for the appointment of district health officers was further held in abeyance. Qualified health officers were employed only in the municipalities of Nagpur, Jubbulpore and Amraoti; in some others, trained sanitary inspectors were in charge of sanitation. Only 69 sanitary and health inspectors in all were employed, 22 of these being at work in Nagpur district. In rural areas, the village sanitation Act, the *Mukaddam* rules, the *Ryotwari* system and the village *Panchayat* Act continued in operation. The scheme of rural uplift work consisting of sanitary surveys, drainage improvements, rubbish and manure disposal, disinfection of water supplies, etc., was at work in the Piparia circle of Hoshangabad district; in 6 villages in Damoh subdivision; and in 17 villages in Nimar district. No scarcity camps were found necessary.

Two nursery schools did useful work at Nagpur and Pachmarhi. Two publicity officers carried on health education in selected tracts. The Public Health Institute, Nagpur, was responsible for bacteriological and chemical analyses and examination of foods, drugs and pathological specimens.

The present district health organisations being insufficient to perform all the duties assigned to them, it has been found necessary to concentrate the work in smaller areas in order to obtain more definite results. For example, resident public health officials have been appointed for groups of villages in the Gorakhpur district and these staffs supervise the disinfection of wells, the distribution of quinine and anti-cholera medicines, vaccination, registration of vital statistics, health propaganda, training of *daïs* and enforcement of public health byelaws. Rural reconstruction or village uplift committees have been organised in many districts.

With the exception of Gorakhpur, M. O. Hs. were at work in all municipalities required to employ them. The district health officer of Gorakhpur was also *ex-officio* M. O. H. of Gorakhpur municipality. As the entire pay of M. O. Hs. is now met by the local government, their appointment in other municipalities was held in abeyance until funds were available. Government contributions towards the pay of municipal sanitary inspectors were discontinued with effect from 1932-33.

### Bihar and Orissa.

The number of A. D. P. Hs. was reduced from 4 to 3 and the areas under the charge of these officers were re-arranged to form 3 circles, *viz.* (a) South Behar, (b) North Behar and (c) Chota Nagpur and Orissa. Their duties include the investigation and control of epidemics, the supervision of vaccination, cholera inoculation and other permanent prophylactic measures, the inspection of nuisances, *melas* and fairs, district boards, municipalities, union boards and high schools. They also carry out propaganda by means of lectures and lantern demonstrations. The recommendations made by the A. D. P. Hs. are usually acted upon where no heavy expenditure is involved, but otherwise there is room for further improvement in many directions.

Eleven district boards have organised health schemes each with a health officer and a varying number of subordinates, including assistant health officers, health inspectors and assistant health inspectors trained in the provincial sanitary school at Gulzarbagh. The district boards of Patna, Muzaffarpur, Cuttack, Puri and Balasore received government grants covering half the total cost; Saran, Champaran, Gaya and Bhagalpur employed M. O. Hs. wholly paid by government; whilst Darbhanga and Purnea met the cost of their own health staffs. The district boards of Shahabad, Monghyr, Manbhum, Hazaribagh and Ranchi, which have so far neither health officers nor organised health schemes, were offered the free services of government M. O. Hs. provided they paid the latters' travelling allowances and employed an adequate subordinate staff, but so far only Shahabad district board has accepted the offer. Other districts maintain only a small health staff and either recruit additional officers when an emergency arises or obtain the loan of the services of epidemic doctors from the permanent cadre maintained by government. Over 100 trained epidemic vaccinators are also available for disinfection work throughout the province.

Of 58 municipalities only Gaya, Patna and Puri had whole-time health officers paid for by government; Bhagalpur employed a part-time health

reduced from 3 to 2, one holding the combined charge of the epidemiology and malariology bureaux and the quinine factory and the other the publicity bureau and the school health service. The administration of the provincial hygiene institute was entrusted to the senior lecturer. Up to this year, the power to create and abolish M. O. H.'s posts in towns rested with the local boards. Whilst these officers had no fixity of tenure under the Municipalities Act, they exercised powers under that Act only when these were delegated to them by the executive officers. This anomalous position has been removed under the U. P. Municipalities Amendment Act which was passed during the year. The new Act includes the following provisions:—(a) Every board with an annual income of Rs. 50,000 or over shall, unless the local government otherwise directs, employ a M. O. H. from the provincial public health cadre; (b) a M. O. H. is liable to transfer only on sufficiently reasonable grounds; and (c) subject to the approval of municipal authorities the exercise of powers relating to public health and conservancy has been reserved to M. O. Hs.

The district health scheme was in force in 28 districts but 20 others still have no permanent health staffs. District M. O. Hs. in addition to supervising the sanitation and vaccination work of the smaller municipalities, visited 45,409 villages including 8,328 where epidemics existed. They gave training in village-aid work to 46,685 school boys, 15,401 government servants, school teachers, *choukidars*, *patwaris*, and subordinates of the Co-operative Department and 12,847 other persons. They also opened 431 first-aid dispensaries, including 60 in the district of Muzaffarnagar, 46 in Gonda, 42 in Benares and 40 in Partabgarh. Other activities included 646 lantern demonstrations and 41,377 lectures; the training of 10,168 *dais*; and the examination of 123,144 children in 1,844 schools. Village-aid dispensaries totalled 2,316 as against 2,082 in 1931; the whole scheme was in force in 1,064 villages and part in 5,447. Table IV (i) gives numbers of first-aid dispensaries for each district.

TABLE IV (i).

	Opened during 1932.	Total.		Opened during 1932.	Total.
Provincial total	431	2,439			
Muzaffarnagar	60	130	Naini Tal	10	23
Bulandshahr	10	367	Garchwal	..	46
Muttra	..	80	Lucknow	9	69
Moradabad	13	96	Unao		
Fatehpur	21	185	Rae Bareilly	7	49
Allahabad	7	82	Sitapur	12	33
Benares	42	80	Hardoi.	..	39
Mirzapur	24	24	Kheri	23	45
Jaunpur	8	48	Fyzabad	25	142
Ghazipur	7	77	Gonda	46	62
Ballia	1	56	Bahraich	11	57
Gorakhpur	15	68	Sultanpur	11	121
Basti	13	20	Partabgarh	40	110
Azamgarh	1	315	Bara Banki	15	15

## SECTION IV.

## PUBLIC HEALTH ADMINISTRATION.

## Administration.

## N.-W. F. P.

50. The I. G. C. H. is *ex-officio* D. P. H. and has one A. D. P. H. working under him. Public health work generally has not yet reached a very high standard in this province. The public health laboratory in Peshawar continued to carry out successful work.

## Punjab.

Of the 4 A. D. P. Hs., 3 held charge of the Rawalpindi, Lahore and Ambala circles. The number of district medical officers and assistant epidemiologists was reduced from 39 to 37. No reductions were made in the sanitary inspectors or the sub-assistant health officers and a special staff of 2 sub-assistant health officers, 4 sanitary inspectors and 2 dispensers was employed for about 5 months to assist in combating the cholera epidemic. The question of provincialising the service of M. O. Hs. was still under consideration. Only 13 of the larger municipalities employed wholetime M. O. Hs. with D. P. H. qualifications. In 24 cases, local bodies utilized assistant and sub-assistant surgeons in charge of civil dispensaries as part-time M. O. Hs.; 5 municipalities employed private practitioners in a similar capacity; and in 5 others the civil surgeons acted as part-time health officers.

The activities of the epidemiological and educational bureaux and the public health dépôt at Jullundur were continued.

## United Provinces of Agra and Oudh.

The Public Health Department suffered drastic retrenchments which included (a) the abolition of one A. D. P. H., (b) the temporary abolition of the A. D. P. H. in charge of the provincial Hygiene Institute, (c) the abolition of eight Asstt. Distt. M. O. Hs., (d) the abolition of 13 travelling dispensaries and of 15 medical officers in charge and (e) the withdrawal of the grant for labour gangs.

The total allotment for the Public Health Department, including the Engineering Branch and the Board of Public Health, was Rs. 19,18,000 as against Rs. 23,88,485 in 1931-32. Out of this sum, the budget of the D. P. H. amounted to Rs. 12,77,915 as compared with Rs. 15,15,178 in 1931-32.

As a result of these retrenchments, general inspection duties are now carried out by 2 A. D. P. Hs. and the province has been divided into 2 ranges instead of 3. The number of A. D. P. Hs. for technical duties has also been

## Abbreviations

D. P. H.  
A. D. P. H.  
M. O. H.  
M. O. S.  
I. G. C. H.  
L. C. P. S.  
U. P.

Director of Public Health.  
Assistant Director of Public Health.  
Medical Officer of Health.  
Medical Officer of Schools.  
Inspector-General of Civil Hospitals.  
Licentiate of the College of Physicians and Surgeons.  
United Provinces of Agra and Oudh.

has long been a matter of debate, and the *pros* and *cons* are numerous. At a small conference of workers, connected with health schools and organised by the Maternity and Child Welfare Bureau, Indian Red Cross Society, which was held at Delhi in January, 1932, it was agreed that one school at least was necessary which would be capable of undertaking the training of a superior class of worker. These trained workers would be able to take on administrative and supervising work and be fit to undertake the training of less highly educated health visitors. This opinion was voiced at several points and it was unanimously agreed that such workers were necessary for the future progress of health work in India. The course of training visualised for such workers would approximate more closely to the wider conception of a health visitor's work which has been indicated above.

### Indian States.

#### MYSORE STATE.

49. A total of 6,257 maternity cases were conducted in maternity hospitals and among these 108 maternal deaths occurred.

162 cinema shows were given to audiences totalling 124,485 persons. In addition to the 4 welfare centres in the Kolar Gold Fields, voluntary organisations engaged in maternity and child welfare work included (i) the Mysore State branch of the Indian Red Cross Society which held first-aid and home nursing classes in 20 institutions; (ii) the Civic and Social Progress Associations in Mysore and Bangalore; (iii) Sree Gunamba Maternity and Child Welfare Trust, Mysore, (iv) the Mahila Seva Samaji, Bangalore; (v) Seva Ashram Malleswaram, Bangalore city; and (vi) the military child welfare centre, Bangalore.

In *Bangalore city* (population 172,357), of the 6,038 births recorded, 2,454 were delivered in the maternity hospital, and 1,608 by municipal midwives; the remaining 1,976 did not receive skilled service. The city health department organized small exhibitions for the welfare institute of the Bangalore Woollen, Cotton and Silk Mills Co., and the Sree Sharada Stri Samaja, Chamarajpet, as an adjunct to the health and baby week arranged by them.

In *Mysore city* (population 107,122) 2,769 births and 2,624 deaths were registered giving rates of 26 p.m. and 25 p.m. respectively. Still-births numbered 70 and 329 infant deaths were registered, corresponding to a rate of 112 per 1,000 live-births. The Gunamba Maternity and Child Welfare Trust, the Civic and Social Progress Association and the city Branch of the Indian Red Cross Society continued to concentrate on maternity and child welfare work. In the various centres established by these associations babies were bathed, given milk feeds, weighed and medically advised. Expectant mothers were advised at the ante-natal clinics.

In the *Kolar Gold Fields* (population 85,103), of the 3,769 births, 830 or 22% were conducted in the Government maternity hospital, Robertsonpet; 1,578 or 42% by qualified midwives; and 1,361 or 36% by untrained midwives and *dais*. The mining authorities employed 9 and the Sanitary Board 2 midwives.

sion of training for health visitors. Miss Beard visited the various schools and saw as much as possible of the subsequent work undertaken by those trained in these institutions. Her predisposition was in favour of full nursing training before the health course and it was not easy for her to understand the prejudices which have so far hindered the development of adequate nursing in India. Miss Beard has not so far submitted a report of her tour but it is to be hoped that it may contain suggestions for future training in India which will be helpful to the responsible authorities. The methods of training at present in vogue should certainly not be regarded as stereotyped, for the last word on training has not been said either in Europe or in America, much less in India. It behoves us, therefore, to keep open minds on the subject and be ready for fresh developments. Miss Beard was struck by the rather narrow conception prevailing in India of a health visitor's work. It concentrates almost exclusively on maternity and child welfare leaving other fields, where women's help is desirable, untouched. This is regrettable but almost inevitable at present in such a poor country. There can be no doubt that wider training for health visitors would be of great advantage, so that if occasion offered they might combine their present work with other branches of public health, such as anti-tuberculosis work, venereal diseases work and medical inspection of school children. At the same time the tendency in a few places to employ nurses on special work such as anti-tuberculosis schemes is uneconomical and mistaken in policy. The workers are too few to allow of reduplication of this kind. It is much better to have one worker concentrating in a small area and showing what can be done than to have two or three working aimlessly over the whole of a large town.

The number of Health Schools at work in India in 1932 was the same as in 1931, the reopening of the School in Madras being balanced by the closing of that in Lucknow. The decision to abandon the U. P. training school is a most regrettable one, especially in a province where considerable work has been started and carried on for some years. Moreover the course for women sub-assistant surgeons which had been tried for one year only has also been given up. This was a new experiment with great possibilities and might well have been given further trial.

Two of the health schools in India are financed by Provincial Governments, namely, those in the Punjab and C. P. The Red Cross Society is mainly responsible for the Lady Reading Health School, Delhi, the Bengal Training School for Health Welfare Workers and the Training School at Madras. The training school at Poona undertaken by the Seva Sadan Society has been put on a better basis and the salary of the superintendent is paid from the Indian Red Cross Society Headquarters. It will thus be seen that the training is mainly done by voluntary societies. There are advantages in this arrangement, as it is necessary at the present stage to have freedom for experimentation and development on lines not always possible in government institutions. The provincial governments concerned should, however, give greater financial aid than they do to the schools. Neither in Bengal nor in Bombay is any grant whatever given to the institutions in these provinces. Of the 6 training schools, those in Delhi, Lahore, Calcutta and Madras give courses in English; the instruction at Nagpur and Poona is in the vernacular. The question of the medium of instruction in this course, as in other educational institutions,



woman superintendent, a woman health visitor and 8 qualified midwives. The maternity staff conducted 1,053 maternity cases. 55 deaths due to child-birth were recorded.

*Prome* (population 28,295).—The birth rate was 36 p. m. and the death rate 36 p. m. The town has a society for the promotion of infant welfare. The 2 result-system midwives employed attended 364 confinements. Two other qualified midwives also practised in the town. 50 still-births were reported. Out of every 1,000 infants born, 295 are said to have died.

#### BALUCHISTAN.

Returns are available in respect of Quetta-Pishin and the Cantonment of Quetta only. In *Quetta-Pishin* (population 34,881), 907 births or 26 p.m. and 850 deaths or 24 p.m. were recorded. Infant deaths numbered 163, giving a rate of 169 per 1,000 births. The principal causes of death were fevers 441, respiratory diseases 133, dysentery and diarrhoea 21, smallpox 17 and cholera 7. In the *Quetta cantonment* (population 25,391), 125 births (5 p. m.) and 59 deaths (2 p. m.) were registered. 12 infant deaths were recorded.

#### MYSORE STATE.

*Bangalore Civil and Military Station* (population 134,113).—5,266 births, giving a birth rate of 39 p. m., and 183 still-births were recorded during 1932-33. Of the total births, 1,497 were conducted by municipal midwives, 722 by *dais* and 1,286 by private practitioners and other midwives. The death rate was 29 p.m. and the infant mortality rate rose to 200 p.m. The main causes of this mortality were convulsions (222), diarrhoea (59), broncho-pneumonia (126), inanition (159), premature birth (333) and other causes (154). The staff consisted of 2 qualified health visitors who worked under the health officer. The 7 welfare centres and 4 day nurseries were maintained. Among the maternity cases attended by the municipal midwives, only 8 infantile deaths and 1 maternal death occurred. The health visitors paid 11,916 home visits. The local association provided training for *dais*. The Peninsular Tobacco Company maintained the day nursery in their factory.

#### (f) Health Schools.

48. The importance of well trained workers cannot be too much stressed as fundamental for good health work among women and children, but many committees and local bodies are still content with workers without proper qualifications. This happens occasionally because they find it hard to secure such workers, but demand creates supply and it is unfortunate that employing bodies are not more strict in their selection of candidates. The future of the profession of health visiting or public health nursing is, however, not without hope. It is being realised that this profession offers good openings for young women of education and character and it is an undoubted fact that many parents are now willing that their girls should enter it, while they are still unwilling to allow them to take up general nursing. This is in some ways regrettable, because a complete nursing course is probably the best preliminary training for candidates who are taking up health visiting.

In the winter of 1932-33, Miss Mary Beard of the Rockefeller Foundation visited India. The primary object of her visit was to investigate the provi-

The National Health and Baby Week was celebrated. A baby welcome home was maintained in the mill area where poor and sickly children were given baths and ordinary ailments were treated.

*Trichinopoly* (population 142,843).—Births and deaths totalled 4,668 and 3,585, giving rates of 33 p. m. and 25 p. m. 14 qualified midwives were at work, 7 being employed by the Municipal Council and the others being private practitioners. These conducted 2,136 labour cases or 46% of the total. The health centre was in charge of a woman sub-assistant surgeon and it was proposed to open a women's and children's hospital with 3 maternity and 3 children's beds.

*Calicut* (population, 99,273).—Births numbered 3,221 and deaths 2,843, giving rates of 32 p. m. and 29 p. m. respectively. 183 still-births and 65 deaths from child birth were registered. The 3 municipal midwives conducted 287 maternity cases and 244 labour cases attended the Government Women's and Children's Hospital. Cases delivered by qualified midwives totalled 1,055 or 33% of the total. Four child welfare centres were at work, each receiving a municipal grant of Rs. 35 p. m. 532 infant deaths corresponding to a rate of 165 per 1,000 live-births were recorded; convulsions and debility were the chief causes.

*Vizagapatam* (population 57,303).—1,933 births and 1,685 deaths were registered. The birth rate was 34 p. m. and the death rate 29 p. m. Deaths under one year totalled 576 giving a rate of 298 p. m. live-births. Of the total infant deaths, 193 were under 1 month, 252 between 1—6 months and 131 between 6—12 months. Maternal deaths numbered 44 with a death rate of 22 p. m. live-births; still-births totalled 99. An infantile death rate of 607 p. m. was recorded among the Adi-Andhras. Only 3 of the 5 midwives provided for in the budget were at work, and as a result the percentage of cases receiving skilled aid fell from 60 % to 50%. The National Health and Baby Week was celebrated.

## BURMA.

*Rangoon* (population 400,415).—8,988 births and 9,875 deaths were registered, the respective rates being 22 p. m. and 25 p. m. The crude infantile mortality rate was 286 per 1,000 live-births. Of the 8,988 births registered, 2,210 or 25% were attended by qualified medical practitioners or midwives, and 2,362 or 26% received no skilled service. 1,891 women were confined at the Dufferin Hospital and 1,515 at the maternity and infant welfare society shelters. 693 or 8% of the registered births were still-born.

The maternity and child welfare staff comprised 2 woman health assistants and 11 woman health visitors and nurse midwives. The health assistants supervised the work of the health visitors and of the infant milk depots. The health assistants paid 1,349 ante-natal and 2,418 post-natal visits and treated 56,563 cases at the Corporation dispensaries. 940 confinements were attended and 10,329 ante-natal and 18,840 post-natal visits were paid by the nurse midwives and the health visitors.

*Mandalay* (population 147,932).—The birth and death rates were 56 p. m. and 44 p. m. respectively and the infantile death rate was 287 per 1,000 births. The local infant welfare society maintained a clinic with a staff comprising a

in patients' houses and 1,307 in its 3 maternity homes, whilst 3,478 cases were sent to hospital. A crèche attached to one of these centres provided for 55 children.

*Ahmedabad* (population 382,693).—15,870 live-births (41 p.m.) and 14,330 deaths (38 p.m.) were registered and the infantile mortality rate was 310 p.m. 61% of the total deaths occurred in children under 5 years of age. The 10 municipal midwives conducted 1,109 deliveries. A maternity home was maintained.

*Ahmednagar* (population 41,890).—The birth rate was 32 p.m. and the death rate 25 p.m. Still-births numbered 63 or one for every 34 live-births. Of 319 infant deaths, 121 were among those under 1 week, 49 between 1—4 weeks, 67 between 1—6 months and 82 between 6 and 12 months. 98% of the deaths under 1 week were attributed to convulsions and prematurity. The town is without a lady health visitor. Maternal deaths totalled 20, giving a rate of 9 per 1,000 live-births.

*Karachi* (population 247,791).—11,830 live-births and 7,340 deaths were recorded, the rates being 48 and 28 p.m. respectively. Still-births numbered 341. Although the municipality had 3 maternity homes, and the local health association employed 2 health visitors and 7 qualified midwives, whose services are given free, 7,106 births were conducted by unqualified *dais* and 105 deaths from childbirth were registered. The infant mortality rate increased from 164 to 202 p.m. 1,771 maternity cases, with 37 still-births and 12 deaths, were conducted at the municipal maternity homes.

#### MADRAS PRESIDENCY.

*Madras City* (population 664,900).—Totals of 27,996 births and 22,290 deaths were registered, giving rates of 42 p.m. and 34 p.m. The number of still-births was 1,326, or 47 per 1,000 live-births. No less than 6,622 infant deaths, or 237 per 1,000 live-births, were recorded. 1,451, or 22%, died within the first week; 973, or 15%, between 1—4 weeks; 2,485, or 38%, between 1—6 months; and 1,713, or 26%, between 6—12 months.

Deaths from child birth numbered 279, or 10 per 1,000 live-births. 66% of these deaths were due to puerperal sepsis. The maternity and child welfare staff included 12 women doctors, 82 midwives and 31 health visitors. 15,108 labour cases, or 42% of total births, were attended by the staff and, of these, 62 maternal deaths were reported. The women doctors paid 16,130 visits and treated 249,583 cases at the outpatient clinics. The average daily attendance at the clinics was 687. The health visitors and midwives visited 170,530 and 197,711 cases respectively. The number of premature cases registered at the centres was 13,476; of these 11,510 had attended the centres for ante-natal advice and treatment. A total of 251 abortion cases were treated. Of 598 lectures delivered at the welfare centres, 286 were illustrated with lantern slides.

*Madura* (population 181,884).—The birth rate was 38 p.m. and the death rate 28 p.m. Seven midwives worked in the town and 4 were attached to the 2 maternity homes but only about 13% of the recorded births received skilled service. Of the 869 births attended by these midwives only 6 proved fatal.

in three rooms 264 p.m., in four or more rooms 129 p.m.; and 66 p.m. among those born in hospitals. These figures illustrate the effects of overcrowding on infant life. Table III (d) shows that only 35% of the total deaths were certified.

TABLE III (d).

	Death certificates from					Total.	Percentage to total mortality.
	Hospitals.	Practitioners.	Hakims ; Vaidyas.	Police.	Coroner.		
1928	4,483	3,056	26	268	641	8,474	31
1929	4,769	3,325	15	260	899	9,259	35
1930	3,929	3,242	15	198	518	7,902	29
1931	4,213	3,484	10	128	621	8,456	34
1932	4,031	2,963	9	170	831	8,004	35

Still-births numbered 2,024 and the infant mortality rate was 218 per 1,000, the lowest figure ever recorded. Of the infant deaths, 25% occurred during the first week of life; 15% during the first month; 26% during the ages 1-6 months and 34% between 6 and 12 months. Debility and prematurity were responsible for 88% of the deaths under one week and for 82% of those between 1-4 weeks; respiratory diseases for 43% between 1-6 months and for 69% between 6-12 months; and debility and premature birth for 27% between 1-6 months. Infantile death rates according to race are given below:—

Hindus (low caste)	249
Hindus (all other castes)	226
Mussalmans	213
Parsees	77
Jews	101
Indian Christians	217
Anglo-Indians	140
Europeans	14
Buddhists	120

Maternal deaths numbered 194, or 7 per 1,000 births. Ten municipal nurses, 1 for each registration district, paid 21,493 home visits, enquired into 2,689 cases of sickness and reported 110 cases of infectious disease and 273 deaths among females. They also attended 1,144 confinements and verified 6,197 births. Municipal nurses attended 12% of the total confinements; 10% were attended by qualified nurses not municipally employed; 27% by unskilled women; 46% were conducted in hospitals; and 5% were unattended. 68% of all the infants born in the city were born healthy. Various forms of relief were as usual afforded to poor women.

No less than 59 institutions providing a total of 986 beds undertook maternity work and they conducted 19,633 confinements. The 5 municipal maternity homes, with 134 beds, admitted 3,898 cases. The 7 voluntary welfare centres maintained by the Infant Welfare Society admitted 5,845 new cases, whilst 384,586 attendances were made for medicine, advice and treatment. The nurses of the infant welfare society attended 467 confinements

in 967, marasmus in 288 ; and tetanus in 494. Bronchitis and broncho-pneumonia caused 1,608 and diarrhoea and enteritis 370 infantile deaths.

Seven milk kitchens were maintained in the city, one in each of the districts and added areas, where 1,473 *maunds* of milk were distributed to 564 boys drawn especially from the *bustee* population.

Baby welfare work was an important part of the duties of the health visitors and sisters-in-charge and received special attention. As soon as the puerperal period of 10 days was over, the babies were transferred from the midwives' baby registers to the baby welfare work registers of the health visitors, who continued home visits regularly and systematically until the infants were 3 months old. During this period, the mothers were given advice and were treated, if necessary, and the babies were provided with warm clothing, nourishing diet, etc. as might be found necessary.

#### CENTRAL PROVINCES.

*Nagpur* (population 162,040).—Births and deaths numbered 8,998 and 6,516 respectively, giving rates of 56 and 40 p.m. The infantile death rate was 260 p.m. (345 in 1931), and 36% of the infant deaths occurred in the first week of life and 26% between 1 and 6 months. The municipality maintained 4 welfare centres, each in charge of health visitors, who conducted a total of 198 maternity cases. Total attendances at the clinics numbered 42,255. *Dais* classes were held.

*Amraoti* (population 46,832).—Birth and death rates were 49 p.m. and 26 p.m. The still-births numbered 69, and 380 infant deaths were registered, giving an infantile mortality rate of 165 per 1,000 live-births as compared with 285 in 1931. The municipal board employed 2 qualified midwives, whilst 2 welfare centres managed by the Indian Red Cross Society were also at work, the Municipal Board contributing to these Rs. 1,800 annually. Of the 49 *dais* practising in the town, 16 were trained, 13 were under training and 20 were untrained.

*Jubbulpore* (population 104,317).—The birth rate was 46 p.m., the death rate 31 p.m. and the infantile mortality 231 p.m. of live-births.

#### BOMBAY PRESIDENCY.

*Bombay City* (population 1,161,383).—28,894 births were registered giving a birth rate of 25 p.m. Of this total, 19,633 or 64% were conducted in municipal, government and private maternity institutions. The recorded birth-rate in Bombay is said to be an underestimate because of the common custom among the women of returning to their own villages for their confinements. During recent years, however, this custom has been less practised because under the maternity benefit scheme applicable to the labouring classes benefit can only be claimed after registering the birth in the city and obtaining a birth certificate.

Deaths numbered 22,856, giving a death rate of 20 p.m. According to the recent census, 74% of the population belongs to the poorer classes and lives in one room tenements. Amongst these an infant mortality rate of 438 p.m. of births was recorded. For those living in two rooms the rate was 265 p.m. ;

the work of the midwives placed under them and personally attended labour cases when necessary. The sister-in-charge of the Manicktala unit supervised the work of the 2 attached midwives and attended labour cases in her own area. The 3 midwives of the Cossipur centre worked independently but the senior nurse was in charge of the unit.

The services given by these health visitors and midwives, especially to the *bustee* residents, cannot be over-estimated. They delivered 6,947 cases and transferred 103 difficult cases to hospitals. Infantile deaths amongst babies delivered by the Corporation staff totalled 104, excluding 177 still-births, and there were only 5 maternal deaths. The infant mortality rate during the first 10 days of life was 15 p.m. whilst the same rate for the city during the first week of life was 60 p.m.

Four maternity homes were maintained in different parts of the city under the direct control of the Corporation ; these were Baldeodas maternity home, Chetla maternity home, Kidderpur maternity home and Manicktala maternity home. All these institutions had up-to-date equipment for the management of labour cases as well as the treatment of patients. They worked under the management of qualified women doctors and their popularity was remarkably evident. The Baldeodas maternity home was the most important having 31 permanent beds as also an outdoor dispensary for the treatment of gynaecological and other woman's diseases. No less than 25,848 old and new cases were treated there ; new cases numbered 8,616. The Kidderpur maternity home in the southern part of Calcutta, had 24 beds, a gynaecological ward of 4 beds, and an outdoor dispensary where 12,208 gynaecological cases were treated ; the Chetla and the Manicktala homes had 18 and 12 beds respectively. The Baldeodas home admitted 2,121 labour cases ; of these, 1,820 were full-term labour cases, 1,504 normal and 316 abnormal ; in addition, 283 difficult operations were performed. The Kidderpur home admitted 906 labour cases ; and 149 operations were performed. The Chetla and the Manicktala homes admitted 474 and 204 labour cases respectively. Only 16 maternal deaths occurred in the Baldeodas home, 10 cases in the Kidderpur home, 3 in the Chetla home and 2 in the Manicktala home.

In the Baldeodas maternity home, a training class for nurses has been held since 1926. Pupil nurses are admitted in January and in December of each year, selections for admission being made by the M. O. H. after a preliminary general knowledge examination. Four lecturers selected by the P. H. Committee delivered courses of lectures to both batches of pupil nurses ; during 1932, 10 nurses only qualified and certificates in the prescribed form were granted to them. This training class was gaining in popularity and the numbers seeking admission were gradually increasing. A proposal to affiliate this institution to the Bengal Council of Medical Registration was under consideration.

Registered births totalled 24,925 and infantile deaths 6,123, the death rate per 1,000 births being 246. Of these, 4,086 deaths took place amongst Hindus, giving a rate of 222 p.m. ; and 1,903 amongst Muhammedans, giving a rate of 335 p.m. Only 53 infantile deaths were recorded amongst non-Asiatics and Anglo-Indians ; 81 amongst Indian Christians ; and 10 amongst other classes. Premature birth was the cause in 807 cases ; congenital debility

*Bareilly* (population 144,031).—Out of 6,761 registered births, 1,188 infant deaths were recorded, giving a death rate of 176 per 1,000 births. The maternity and child welfare centre continued to work successfully, the staff attending 2,115 labour cases. Four assistant midwives were trained.

*Meerut* (population 91,181).—A maternity and child welfare centre was opened by the district Red Cross Society which received Rs. 800 and Rs. 780 respectively from the municipal and cantonment boards for the purpose. The society employed 4 trained midwives for the 4 branch centres in the district in addition to 2 midwives in Meerut town and 2 in the cantonment. Infantile mortality decreased from 247 in 1926 to 162 per 1,000 births.

*Saharanpur* (population 78,655).—The town has one child welfare centre under a woman doctor. The 3 trained midwives conducted 555 cases out of 3,917 births, paid 16,590 home visits and 575 ante-natal visits. The woman doctor attended 35 labour cases and sent 15 cases to the Dufferin Hospital.

*Pilibhit* (population 36,892).—A maternity and child welfare centre under a qualified doctor was maintained by the local branch of the Indian Red Cross Society, the municipal board contributing Rs. 720. The 2 trained midwives conducted 199 cases, and 1,748 cases were attended by indigenous *daïs*. Deaths from tetanus numbered 133. The birth rate was 56 p.m., the death rate 37 p.m. and the infantile mortality 263 per 1,000 births.

*Moradabad* (population 110,562).—The birth rate was 51 p.m. and the death rate 31. The municipal midwife attended 185 labour cases. 36 Junior Red Cross groups were formed during the year.

*Cawnpore* (population 219,189).—Three maternity and child welfare centres were maintained and the staff attended 4,582 maternity cases and paid 59,797 health visits. 33 indigenous *daïs* were trained of whom 20 qualified. 33 trained *daïs* were at work in the town.

The birth rate was 55 p.m., the death rate 35 p.m. and the infantile death rate 224 per 1,000 births. The gradual decrease in infantile mortality is attributed chiefly to the maternity and child welfare work and to improvement of drainage, roads and lanes.

*Benares* (population 201,037).—The birth rate was 55 p.m. and the death rate 50 p.m. Of 2,667 infant deaths, 1,166 occurred among those aged one month or less. The town is without a maternity and child welfare scheme. Maternal deaths as well as those from tetanus increased; the services of 8 *daïs* were dispensed with.

#### BENGAL.

*Calcutta* (population 1,196,734).—Seven maternity units were at work under the direct control of the Corporation; 1 in each of the 4 districts of the town proper and 1 in each of the 3 added areas. These units gave free medical relief in labour cases to the poorer classes at their own houses. A qualified health visitor was in charge of each maternity unit in the town and in that at Garden Reach; the Manicktala unit was under a sister-in-charge, whilst the Cossipur centre was managed by a senior midwife. 25 midwives were employed in these units; 4 in each of the units in Calcutta proper and 3 in each of the others. The health visitors, all qualified medical women, supervised

cases and 7 to premature birth. The general death rate was 28 p.m. and the infantile rate was 201 per 1,000 births. The increased summer mortality was attributed to high atmospheric temperatures with dust storms and hot winds. Of the 57 maternal deaths recorded, 10 died of anaemia, 8 of puerperal fever, 9 of tuberculosis, 9 of post-partum haemorrhage, 5 of pneumonia, 4 of eclampsia, 4 of tetanus, 2 of malaria, 1 of dysentery, 1 of enteric and 4 from other causes. In addition to the centre attached to the Lady Reading Health school, the town has 5 large and 4 small welfare centres. The staff consists of a superintendent, 13 health visitors, 9 nurse attendants, 12 midwives and other menials. The 12 municipal *dais* conducted 2,166 midwifery cases. 120 *dais* were under training at the different welfare centres and 10 at the Lady Reading Health School. 23 passed the Central Midwives Board examination. Of 280 *dais* working in the city, 115 were qualified, 63 were untrained and 120 were attending classes.

#### UNITED PROVINCES.

*Muttra* (population 60,590).—Under the auspices of the local branch of the Indian Red Cross Society, the maternity staff conducted 377 cases. Infantile deaths among these cases numbered 116 as compared with 248 among those not so attended. The birth and death rates were 53 and 40 p.m. respectively, and the infantile death rate 249 per 1,000 live-births.

*Agra* (population 205,487).—12,397 births and 7,582 deaths were reported, giving rates of 60 and 37 p.m. respectively. Two welfare centres were at work each under a health visitor. Among the 531 confinements attended by the maternity staff, 33 infant deaths were recorded giving a rate of 62 per 1,000 births as against a rate of 205 p.m. for the whole town. 698 infants and 1,984 mothers were treated or given advice, whilst the maternity staff paid 18,249 home visits. 45 *dais* were trained and 14 qualified.

Expenditure was met partly by the provincial branch of the Indian Red Cross Society (Rs. 2,475) and partly by the municipal board (Rs. 2,180).

*Fyzabad* (population 59,992).—The infantile death rate was 233 per 1,000 births (304 in 1931-32). 49 still-births were registered. The recorded birth rate was 24 p.m. and the death rate 18. Out of a total of 1,423 births, 579 were attended by the welfare staff and amongst these 14 infant deaths occurred. 35 midwives were under training at the welfare centre. A baby week was held.

*Etawah* (population 46,948).—Two midwives were employed, one by the municipal board and the other by the provincial branch of the Indian Red Cross Society, but they attended only 168 out of 2,625 confinements. The birth and death rates were 54 p.m. and 46 p.m. respectively, whilst the infantile mortality rate was 356 per 1,000 births.

*Aligarh* (population 83,878).—A child welfare centre under a woman doctor and 3 midwives were maintained by the district Red Cross Society. 507 labour cases were conducted with only 1 maternal death; 4,028 home visits were paid and 6,209 infants and 1,219 mothers attended the centre. 36 indigenous *dais* were trained. The municipal board adopted byelaws for the training of *dais*. The recorded birth and death rates were 40 p.m. and 22 p.m. and the infantile death rate was 217 per 1,000 births.



Muhammedans 37 p.m. and that of Hindus 32 p.m. The general death rate was 24 ; that of the Sikh community 32 and that of Hindus 31. The infant mortality rate was 123 per 1,000 births. The *dais* school, in charge of a woman doctor, had 11 students on its rolls, 5 of whom qualified. The superintendent delivered 220 lectures and attended 50 confinements. The 2 welfare centres each in charge of a health visitor supervised 245 confinements. The crèche which was also in charge of a woman doctor treated 13,000 new cases.

*Ferozepur* (population 34,337).—The registered birth rate was 39 p.m., the death rate 18 p.m. and the infant mortality rate 141 per 1,000 births. The welfare centre staff consisted of 1 health visitor, the post of the assistant health visitor being held in abeyance for want of funds. 32 trained *dais* practised in the town ; 16 indigenous *dais* were under training and 5 of these passed the examination of the Central Midwives Board. 72% of the total recorded births were attended by trained and 28% by untrained *dais*. A refresher course for trained *dais* was repeated.

*Sialkot* (population 85,093).—The registered birth rate was 42 p.m., the death rate 19 p.m. and the infantile rate 149 per 1,000 births. Still-births numbered 50. Two welfare centres, each in charge of a health visitor, were at work,—one maintained by the municipal board and the other by the Indian Red Cross Society. The health visitors supervised 297 confinements and paid 277 ante-natal and 489 post-natal visits. Classes for *dais* were held at each centre and 2 of the 5 indigenous *dais* who were presented passed the Central Midwives Board examination. The 2 nurse *dais* attached to the municipal centre conducted 73 cases.

*Simla* (average population 38,003).—The crude birth rate was 21 p.m. ; the crude death rate 13 p.m., and the crude infantile death rate 164 per 1,000 births. The welfare staff comprised 1 health visitor in charge, 1 assistant health visitor, 1 maternity supervisor and 9 resident *dais*. Five resident *dais* were also maintained in subcentres. Of the 4 *dais* who appeared for the Central Midwives Board examination, 3 passed ; 3 others were under training. The welfare staff conducted 461 confinements out of a total of 820 and ante-natal visits numbered 2,017. 30 still-births were registered. The maternal deaths numbered 17 ; only 4 of those were attended by the welfare staff.

*Rawalpindi* (population 75,767).—The birth rate was 40 p.m. and the death rate 22 p.m. Of a total of 3,149 registered births and still-births, 2,774 were attended by trained *dais* and 375 by untrained *dais*. The infant mortality rate was 182. The municipal welfare centre was in charge of a health visitor ; ante-natal visits numbered 221, post-natal visits 1,326 and home visits 1,408. The baby clinic was continued. Classes for *dais* were held and 13 were under training. Five passed the Midwives Board examination.

#### DELHI.

*Delhi Municipality* (population 347,539).—The registered birth rate was 45 p.m. Calculated on the female population between the ages of 15 and 40 years the birth rate was 243 p.m. 199 still-births were recorded ; 124 were due to maternal diseases and debility, 49 to incompetency of *dais* in difficult

*Assam*.—At the Lady Kerr child welfare centre in Shillong attendances numbered 1,248. A child welfare exhibition was organised in Silchar and 2 centres were opened in Cachar district.

*Burma*.—Welfare activities were undertaken by voluntary societies, except at Hlegu, where the health unit was at work. Seven towns employed qualified health visitors, in 6 others nurses did home visiting, etc., and 11 had welfare centres. For the development of sound child welfare work, the provision of a health visitors' training school is an urgent necessity.

The Kemmendine Baby Welcome in Rangoon was attended by 3,044 cases and the health visitor paid 4,094 home visits. The Rangoon Maternity and Infant Welfare Society maintained 4 maternity shelters staffed by 2 sub-assistant surgeons and 8 midwives, who conducted 1,627 delivery cases. The Mandalay infant welfare society employed 1 superintendent midwife, 1 health visitor and 8 midwives. These midwives attended 1,014 maternity cases; the health visitor paid 3,823 home visits; and 4,080 cases attended the centre. At Maymyo, 1 health visitor and 2 midwives were employed; 2,911 attendances were made at the 2 centres and the health visitor paid 4,174 home visits. Sub-section (2) of Section 8 of the Burma Nurses and Midwives Act, 1922, which prohibits any one, other than a medical practitioner or a qualified midwife, from attending confinements was applied to this town. At Bassein, the 5 midwives conducted 621 confinements; 1,622 cases attended the centre; and the health visitor paid 4,058 home visits. The health visitor at Monywa paid 2,978 home visits and the registered attendances at the centre numbered 3,657. The rural health unit at Hlegu with a staff of 1 nurse and 4 midwives continued to carry out child welfare work at Hlegu and Dabein; home visits numbered 4,946; attendances at centres 2,551; and the midwives conducted 897 maternity cases. A child welfare centre was opened in Meiktila; whilst 11 local societies limited their activities to maternity work or arranged for home visiting by voluntary workers. A new society was opened at Pyapon.

#### (e) Municipal Activities.

47. As in previous years, it seems desirable to make brief mention of the maternity and child welfare activities carried out in a few towns where special mention is made of the subject in the annual reports of the municipal medical officers.

#### PUNJAB.

*Lahore* (population 400,075).—12,032 births and 9,959 deaths were registered, giving rates of 30 and 25 p.m. respectively. 643 still-births were recorded and the infantile death rate rose from 185 to 228 p.m. due, it was said, to an epidemic of smallpox. The staff of the municipal welfare centres paid 531 first visits and 1,637 revisits to infants and 290 visits and 467 revisits to expectant mothers. 38 *dais* attended the *dais* class and 5 of the 6 *dais* who appeared for the Central Midwives Board examination passed. The health visitors supervised 210 maternity cases and 284 were sent to hospitals.

*Amritsar* (population 263,210).—The total of 9,429 registered births gave a rate of 34 p.m. The birth rate for the Sikh community was 39 p.m., that of

TABLE III (c)—contd.

*Municipalities*—contd.

	Expen- diture, in rupees.	Centres.	Mid- wives.	Health visitors.	Women doctors.	% re- ceiving skilled aid.	Mater- nity beds.	Mater- nity beds per 1,000 births.
Bodinaya Kanur . . .	..	..	1	..	1	17.5	..	..
Palni . . .	260	..	1	..	..	15.4	..	..
Periyakulam . . .	960	1	3	..	1	13.3	2	2.1
Kodaikanal . . .	150	1	3	..	..	55.3	1	3.9
Calicut . . .	1,680	4	17	..	2	23.4	8	2.8
Palghat . . .	..	1	6	..	1	12.3	3	1.8
Cannanore . . .	2,110	1	11	..	3	68.0	3	2.8
Tellicherry . . .	1,580	1	11	..	1	43.0	11	12.4
Cochin . . .	600	1	7	..	4	62.3	4	4.9
Nellore . . .	200	1	23	..	6	78.7	66	35.4
Ootacamund . . .	7,429	2	5	..	1	71.4	26	20.8
Coonoor . . .	270	..	6	..	1	63.2	8	16.6
Vellore . . .	770	3	12	..	3	47.2	79	79.0
Gudiyattam . . .	300	1	2	..	2	38.3	..	..
Tiruvanamalai . . .	450	1	1	..	1	16.3	..	..
Vaniyambadi . . .	100	..	1	..	..	12.0	4	6.6
Tirupattur . . .	..	..	2	..	1	47.8	..	..
Walajpet . . .	..	..	1	..	..	..	..	..
Strivilliputtur . . .	..	..	1	..	1	16.6	..	..
Virudhunagar . . .	..	..	1	..	1	24.7	..	..
Sivakasi . . .	..	..	1	..	1	25.9	..	..
Karaikudi . . .	..	..	2	..	1	33.1	..	..
Salem . . .	3,400	2	8	1	3	30.6	21	5.1
Cuddalore . . .	1,180	2	7	..	4	36.5	14	6.6
Chidambaram . . .	450	..	4	..	1	36.6	4	5.2
Villupuram . . .	500	..	2	..	1	36.4	1	1.8
Mangalore . . .	3,260	2	28	..	2	76.7	24	10.8
Kumbakonam . . .	1,780	..	9	..	4	51.1	6	2.7
Tanjore . . .	1,150	2	9	1	3	33.7	12	4.8
Nagapatam . . .	600	2	8	..	2	35.4	10	6.5
Nayavaram . . .	432	1	9	..	1	38.1	2	1.9
Tiruvarur . . .	..	..	4	..	..	17.2	..	..
Mannargudi . . .	360	1	3	..	1	34.5	4	4.8
Tinnevely . . .	1,080	1	6	..	1	31.5	..	..
Palamcottah . . .	300	1	6	..	2	42.2	6	3.6
Tuticorin . . .	2,540	1	10	..	1	47.6	22	11.0
Trichinopoly . . .	3,020	2	14	..	7	46.8	22	5.2
Srirangam . . .	1,160	1	5	..	1	35.1	6	8.4
Karur . . .	380	..	2	..	1	32.1	..	..
Vizagapatam . . .	2,150	1	9	..	5	54.3	32	17.3
Vizianagram . . .	600	1	6	..	1	40.7	16	9.6
Anakapalle . . .	500	..	2	..	..	29.1	..	..
Baniapatam . . .	..	1	4	..	1	62.3	2	5.6

TABLE III (c).

*Municipalities.*

	Expenditure, in rupees.	Centres.	Mid- wives.	Health visitors.	Women doctors.	% re- ceiving skilled aid.	Mater- nity beds.	Mater- nity beds per 1,000 births.
<b>TOTAL</b>		<b>72</b>	<b>671</b>	<b>35</b>	<b>139</b>		<b>767</b>	<b>5.6</b>
Hindupur	..	..	1		1	12.6	..	..
Anantapur	300	1	4		1	63.5	4	7.3
Tadpatri	..	..	1		..	..	..	..
Bellary	650	1	9		2	23.6	4	2.1
Adoni	903	1	1		1	13.4	2	1.7
Hospet	500	..	2		1	15.1	2	2.4
Conjeeveram	..	..	8		1	47.9	13	5.8
Saidapet	370	..	2		..	26.3	..	..
Chingleput	1,698	1	6		1	76.5	12	16.6
Chittoor	1,140	1	5		2	68.4	10	4.0
Tirupati	3,000	..	3		1	33.5	4	7.2
Coimbatore	5,508	3	17		4	45.5	14	4.1
Erode	1,368	1	10		3	36.4	10	10.0
Dharapuram	..	..	5		2	24.9	2	2.9
Pollachi	305	..	2		1	46.3	2	2.6
Tiruppur	..	..	3		1	1.5	..	..
Udamalpet	..	..	1		1	..	..	..
Cuddapah	1,050	1	6		1	56.2	6	6.6
Proddatur	320	..	2		1	23.2	2	2.4
Berhampur	500	1	6		4	30.2	14	10.2
Parlakimedi	..	..	1		1	18.8	2	3.0
Chicacole	120	..	1		..	23.3	..	..
Rajahmundry	960	1	15		3	50.0	2	0.9
Coconada	1,605	1	7		2	57.9	6	3.4
Peddapuram	..	..	1		..	..	..	..
Ellore	1,600	1	7		1	47.9	4	2.0
Palacole	..	..	1		1	23.5	..	..
Guntur	1,190	1	17		10	69.2	108	39.8
Tenali	..	..	2		1	44.1	..	..
Chirala	..	..	1		1	19.8	2	3.3
Ongole	168	1	6		2	27.3	14	17.5
Narasaraopet	..	..	1		..	26.4	2	3.6
Bezwada	2,800	1	5		5	35.8	5	2.0
Masulipatam	3,400	..	8		2	46.4	12	5.4
Karmool	850	1	10		1	50.0	34	2.0
Nundyal	..	..	2		1	10.5	..	..
<b>Madras</b>	..	13	192	32	..	..	..	..
<b>Madura</b>	28,600	1	19		3	21.8	52	7.8
<b>Dindigul</b>	2,900	1	8		2	39.5	4	2.4

The numbers of trained midwives in rural districts varied from 1.1 per 1,000 births in Chingleput to 0.2 in the Nilgiris, whilst the numbers of women doctors varied from 0.3 per 1,000 births in the Nilgiris to 0.02 in South Kanara and Malabar and *nil* in Bellary, Ganjam, Kurnool, Madura and Vizagapatam.

Tables III (b) and (c) give figures relating to maternity relief and child welfare in rural and urban areas. These tables are commended to all Directors of Public Health ; similar information for each province would be of value.

TABLE III (b).

*Rural districts.*

	Expen- diture, in rupees.	Centres.	Mid- wives.	Health visitors.	Women doctors.	% re- ceiving skilled aid.	Mater- nity beds.	Mater- nity beds per 1,000 births.
<b>TOTAL</b>		<b>58</b>	<b>781</b>		<b>104</b>	<b>4.4</b>	<b>542</b>	<b>0.4</b>
Anantapur . . . . .	..	2	17		3	7.2	4	0.1
Bellary . . . . .	..	5	12		..	5.5	..	..
Chingleput . . . . .	11,000	3	55		5	8.8	39	0.8
Chittoor . . . . .	1,750	7	39		7	5.2	41	0.9
Coimbatore . . . . .	6,000	7	26		9	1.6	16	0.2
Cuddapah . . . . .	700	2	17		2	3.4	..	..
Ganjam . . . . .	..	..	25		..	2.5	1	..
Godavari, East . . . . .	..	..	50		10	5.5	27	0.5
Godavari, West . . . . .	1,200	2	20		6	3.4	25	0.6
Guntur . . . . .	..	..	37		3	3.6	35	0.5
Kistna . . . . .	900	1	23		6	4.4	61	1.4
Kurnool . . . . .	..	..	14		..	2.8	8	0.2
Madura . . . . .	1,508	3	29		..	8.5	6	0.1
Malabar . . . . .	..	..	41		2	1.8	8	0.1
Nellore . . . . .	..	..	30		3	4.8	..	..
Nilgiris, The . . . . .	1,000	1	8		1	4.5	18	5.0
North Arcot . . . . .	..	2	53		10	6.0	123	1.5
Ramnad . . . . .	1,800	3	45		8	7.7	18	0.4
Salem . . . . .	6,200	15	35		3	3.9	2	..
South Arcot . . . . .	..	..	38		8	4.0	41	0.5
South Kanara . . . . .	292	1	21		1	2.8	8	0.2
Tazipur . . . . .	1,001	..	58		8	6.3	30	0.5
Tinnevely . . . . .	..	..	26		4	2.8	6	0.1
Trichinopoly . . . . .	2,000	1	33		5	1.7	16	0.3
Vizagapatam . . . . .	6,120	3	29		..	6.8	9	0.1

Of 14 stipendiary and 3 private students at the Health School, 16 passed the examination. This school was closed from 1st April, 1932, for financial reasons but was reopened on a less expensive scale from July, 1932.

*Bombay.*—In the *Southern Registration District* 17 midwives in 14 municipalities attended 1,030 confinements. Baby shows were held in the districts of Belgaum and Dharwar. The lady superintendent and the nurse at the Belgaum centre confined their activities to ante-natal and post-natal advice. In Dharwar town, 124 maternity cases were conducted in the Red Cross maternity ward and 54 at patients' houses and 8 Red Cross midwives carried out ante-natal and post-natal work in the *taluk* headquarters. In the *Sind Registration District*, the lady health visitor in Hyderabad town paid 2,453 home visits and the municipal midwives conducted 644 labour cases. A female hospital and maternity home in charge of a woman doctor was opened in Rohri town. In Sukkur, a maternity and child welfare centre is run by a qualified health visitor and a maternity home by a medical graduate; in addition, 1 qualified midwife and 2 trained *dais* attended 472 confinements. In Hyderabad district, 63 *dais* were under supervision and, of 62 under training, 15 qualified; 53 towns and villages were visited and 242 lectures given. In Karachi, the 6 midwives and the health visitors conducted 1,391 and 35 maternity cases respectively; the local health association also maintained a maternity home, where 651 indoor and 261 outdoor maternity cases were treated. At Larkana, the Mrs. Hamid Ali Red Cross Maternity Home conducted 122 maternity and treated 7,061 gynaecological cases. At Shikarpur, no deaths were recorded among 603 maternity cases. In the *Northern Registration District*, the Broach sanitary association gave lantern lectures and demonstrations and carried out the examination and weighing of children under two years of age at 4 centres; a baby and health week was celebrated in the town and in 8 villages. The Ahmedabad association did similar work and celebrated a baby and health week. Associations in other Registration Districts also worked according to local requirements and opportunities.

The Lady Wilson Village Maternity Association ran 9 centres and the Bombay Presidency Baby and Health Week Association continued to train *dais* and to concentrate on health propaganda, whilst 4,232 confinements were attended at the centres of the provincial welfare society; ante-natal visits at clinics numbered 16,159.

*Madras.*—Registered midwives numbered 1,751 as against 1,513 in 1931. Of a total of 117 welfare centres (127 in 1931), excluding 13 in Madras city, 58 were in rural and 59 in municipal areas. Local bodies maintained 68 and voluntary organisations 49, but many of the latter were given grants-in-aid by local bodies. Only 4 of the 25 rural districts and 3 of the 81 municipalities, excluding Madras, employed a health visitor. Madras city had 32 health visitors. Government sanctioned a recurring grant of Rs. 6,000 to the provincial branch of the Indian Red Cross Society for a school to train health visitors. Registration of midwives was in force under the Nurses and Midwives Act.

the Victoria Memorial Scholarship Fund Rs. 3,300 ; and the central Maternity and Child Welfare Bureau, Delhi, met the pay of the Superintendent, Health School, up to its closure in May, 1932.

Activities of the section included improvement of indigenous *dais*, and training of midwives, assistant midwives and health visitors. It contributed Rs. 14,000 towards the maintenance of the health unit at Partabgarh. 52 child welfare centres were at work in urban and 106 in rural areas as compared with 52 and 73 in 1931. 27,725 cases were attended by the maternity staff with or without the aid of indigenous *dais* but 113,357 cases were unattended. An infantile mortality rate of 85 per 1,000 live-births was recorded amongst the attended cases as against 260 p.m. amongst those dealt with by indigenous *dais*.

For economy reasons, the training of *dais* in hospitals and welfare centres was abandoned except at the provincial training centre at Lucknow. During the year 10,168 were trained, against 8,569 in 1931. All the candidates who appeared at the State Medical Faculty examination were successful. The byelaws for midwives and *dais* were enforced in a few more municipalities. The class for the training of medical women in advanced midwifery and domestic hygiene and the health school were both closed.

**B. and O.**—Under the auspices of the provincial maternity and child welfare society, 7 welfare centres were at work.

**Bengal.**—The government allotment of Rs. 15,000 for *dais* training was, as before, distributed among 23 district boards and 25 municipalities. 106 classes were held and 1,212 *dais* were trained including 963 in rural areas. 838 certificates and 1,060 maternity outfits were distributed to the trained

**C. P.**—The provincial Red Cross Welfare Committee received grants of Rs. 30,000 from the local government, Rs. 16,000 from the provincial branch of the Indian Red Cross Society, Rs. 1,188 for the training of indigenous *dais* from the Victoria Memorial Scholarship Fund and Rs. 599 from other sources. The committee supervised the work of 47 centres in urban and 17, including 14 crèches, in rural areas. Grants were given to many centres for training of *dais* ; to the nursery school, Nagpur ; and to the welfare centre, Indore. Government maintained 43 of the 47 urban centres and all the 17 rural centres. 52 health visitors, 2 trained midwives and 210 trained *dais* were employed in urban areas but in rural areas only 2 health visitors and 4 midwives were at work.

A total of 418,597 attendances were made including 171,601 infants, 235,608 toddlers and 11,388 ante-natal cases. The health visitors paid 202,262 home visits, attended 4,075 confinements and sent 308 cases to hospital. In 44 towns, either midwives were engaged or allowances were given to doctors for conducting labour cases and for home visits. *Dais* classes were held at many centres and those acquiring a fair knowledge of sanitation and modern maternity methods were granted certificates. Baby weeks were celebrated at 23 centres.

The nursery school at Nagpur carried on its work but the Pachmarhi school was not opened owing to the prevalence of epidemic disease among the children.

## (d) Provincial Activities.

46. *N.W.F.P.*—A child welfare association at Dera Ismail Khan employed a health visitor who held ante-natal clinics and paid 2,825 home visits. Training was also given to indigenous *dais*. The health visitor in Mardan treated 1,953 outpatients; examined 611 children; attended 74 confinements and trained 8 *dais*.

*Punjab*.—Eight new centres were opened, 2 by district boards, 4 by the Red Cross Society and 2 by municipal boards; 4 centres were closed. The year ended, therefore, with 42 centres at work, to which the inspectress of health centres paid 46 visits. The health visitors advised 25,000 mothers; 12,808 expectant mothers visited the centres; 3,441 labour cases were attended; and 14,114 confinements were conducted by the *dais* under training at the health centres. 509 still-births and abortion cases were detected and cases of threatened abortion were treated. *Dais* under training numbered 1,405 and 517 obtained the indigenous *dais* certificate of the Punjab Central Midwives Board. The provincial branch of the Indian Red Cross Society contributed Rs. 11,000 for training of village *dais*, and the local government made grants totalling Rs. 15,000 to the welfare centres.

At the Punjab health school all the 8 pupils were awarded the health visitor's diploma and 7 obtained appointments. Eight more students were admitted to the autumn session. The period of training was extended from 6 to 8 months, and in order to provide more practical training in village work, a rural health centre was opened at Fatehgarh. A refresher course was also started.

An Act to provide for the registration and better training of nurses, health visitors, midwives and *dais* was passed and came into force in September. The establishment of a Nurses Registration Council as required under the Act was under way. The Punjab Central Midwives Board continued to supervise the training of midwives and to conduct their examinations.

*Delhi*.—Of the 22 maternity and child welfare centres 16 were in urban and 6 in rural areas. The urban centres included 9 in Delhi city, 6 in New Delhi and 1 in the civil lines. The work in municipal areas is controlled by the municipal health officers; that in rural areas is controlled by the A. D. P. H. and financed in the main from the Delhi baby week fund.

Of 14 health visitors employed in urban areas, 13 were in Delhi city and 1 in New Delhi; there were also 7 trained midwives and *dais* in New Delhi and the Cantonment and 6 in rural areas. Training classes for indigenous *dais* were held twice a week. Work at the smaller centres was supervised by nurse *dais*. Home visits totalled 93,570 in urban and 18,659 in rural areas, whilst attendances numbered 228,456 at urban and 12,670 at rural clinics.

Total expenditure on maternity and child welfare work was Rs. 56,292 (Rs. 52,004 in urban and Rs. 4,288 in rural), this being 7% of the total budget for public health.

*U. P.*—Maternity and child welfare work was carried out by the maternity and child welfare section of the provincial branch of the Indian Red Cross Society. The local government gave grants of Rs. 1,10,000; the executive committee of the Red Cross Society gave Rs. 5,000; the Central Council of



dispensed with as a luxury. The work of voluntary societies is also being hampered by shortage of funds. At such times it is all the more necessary to scrutinise carefully all expenditure and it is more than doubtful if this is being done. Frequently a great lack of intelligence is shown in the spending of money and the result is that avoidable waste occurs. Local bodies are satisfied if they give small grants to societies which may have good intentions but are without knowledge. A well-trained directing hand is essential and at least one special officer should be at work under the D. P. H. in every large province. Unfortunately two out of the three Presidencies have still no such guiding hand, and the consequent lack of co-ordinated effort on behalf of the women and children in Bengal and Bombay is a blot on the public health administration of these provinces. No real advance can indeed be expected without such provision. Were it made, resources could be husbanded and used in constructive effort instead of, as at present is too often the case, wasted on unprofitable forms of charity. The expense of employing such workers is often given as an excuse, but if one province can spare the money, is it not possible for another to do so?

Such child welfare work as is going on at present is almost entirely confined to the towns. The rural areas present a field almost wholly untouched, yet life in the villages is on the whole more advantageous to children than urban life, so that health work has more chance of success there if it could only be initiated. One factor which makes for possibilities in this direction is the advance in road development. This brings the villages into touch with larger centres and widens the villagers' horizon. It also renders possible the visits of medical women or health visitor to individual villages or groups of villages. No single village can hope to afford the services of a whole time worker but one woman resident at a central point could influence a surrounding group of villages. In my opinion this should be the aim in the development of work in rural areas. With this could be combined the co-operation of a number of other agencies such as those alluded to in last year's report.

Depression in trade is also preventing the spread of child welfare work in industrial areas. It is, however, noticeable that business concerns and employers are beginning to realise the fact that care of the health of their employees and their families is an economic proposition. The position in the tea gardens of Assam, for example, is very different now to that in existence some years ago. The Jute and Cotton Mills and the Collieries have not as yet given much thought to this problem but there are signs that they too are waking up to the fact that better housing and greater amenities of life make for stable and contented labour. This is certainly the case in the Army where the increased attention paid to the health and welfare of women and children has led to success beyond all expectations.

Health work among women and children needs more and better forms of propaganda than are at present available. The material is poor and badly thought out and many of the Baby and Health Weeks are little more than "*tamashas*." This is all the more regrettable when one realises that these could be made real stimulating and educative forces. Voluntary societies who are responsible for a great deal of this work would do well to pay more attention to this aspect of their activities.

33% of the total; whilst Berar and Chhattisgarh divisions together recorded 2,486 deaths or 74%.

*Bombay Presidency.*—The number of maternal deaths recorded decreased from 5,316 in 1931 to 4,181. Of these 1,319 were recorded in the Southern Registration District, 1,113 in Sind, 824 in the Central, 789 in the Northern Registration District and 136 in Bombay city. One woman died in child-birth therefore for every 187 live-births giving a death rate of 5·3 per thousand. Corresponding figures for Registration Districts were 1 in 70 in Sind; 1 in 169 in the Southern; 1 in 276 in the Northern; and 1 in 285 in the Central. The urban rate was 1 in 114 and the rural 1 in 216, against 94 and 167 in 1931. The terrible figure of 1 in 44 was recorded in Kanara Collectorate. Of the towns in Sind, Larkana recorded 1 in 25 births, Shikarpur 1 in 37, Hyderabad 1 in 55, Sukkur 1 in 57 and Karachi 1 in 108. In other parts of the Presidency, recorded rates were Thana 1 in 18 births, Nasik 1 in 42, Dharwar 1 in 49, Ahmednagar 1 in 52, Ahmedabad 1 in 75 and Surat 1 in 94.

*Madras Presidency.*—A total of 12,589 deaths were registered giving a death rate of 7·7 per 1,000 live-births as compared with 8·7 in 1931. In rural areas, recorded maternal death rates varied between 4 and 15 per 1,000 live-births. Of the 82 municipalities, the highest rate was 39 p.m. in Cuddapah, and 33 other towns recorded rates of 15 p.m. or over.

*Coorg.*—59 deaths were recorded in rural areas, this figure giving a death rate of 14 per 1,000 live-births as compared with 22 in 1931.

*Assam.*—93 deaths were recorded in the 13 larger towns.

*Burma.*—A total of 435 deaths, or 10 per 1,000 live-births, was recorded in urban areas. Of the towns, Mandalay reported 59 deaths and Rangoon 50; statistics for rural areas were not furnished.

**Maternal death rates** recorded for a number of towns in different provinces are given in Appendix III (p. 378).

### (c) Child Welfare Work.

45. In last year's review, references were made to the reports of the League of Nations Committee on Still-births and Infant Mortality and the Hygiene of Infants and Children of Pre-school age. No serious attempts have been made to estimate the causes of the high infant mortality rates in this country. Some of these are obvious and well known; others are obscure. The tendency of the rate to fall, though noticeable, is very small, just as is the case of the general death rate. The low general level of hygiene, the prevalence of preventable disease and the poor state of nutrition of the people all contribute to a high death rate among children as among adults. A great lowering of the infant mortality rate cannot therefore be expected until the general death rate comes down. There are, however, causes affecting child life specifically which are capable of being attacked and which are as yet receiving very inadequate attention all over India. The amount of child welfare work undertaken is pitifully small and is showing little tendency to increase. Most local bodies are suffering from the economic depression which is affecting the whole world and, since preventive work among children is not regarded as a necessity, it is

## (b) Maternal Mortality.

44. Statistics of maternal mortality are not recorded over the whole of British India but the figures in Table III (a) and the paragraphs which follow, incomplete though they are, give some indication of the present position.

TABLE III (a).

		Maternal mortality.									
		1932.		1931.		1930.		1929.		1928.	
		Deaths.	Rate	Deaths.	Rate	Deaths.	Rate	Deaths.	Rate	Deaths.	Rate
		p. m.	p. m.	p. m.	p. m.	p. m.	p. m.	p. m.	p. m.	p. m.	p. m.
<i>Delhi.</i>											
Rural . . .		26*	2.7	20	2.1	31	3.8	Not available.		Not available	
Urban . . .		63*	3.4	97	5.6	87	5.8				
Total . . .		158†	5.6	117	4.4	118	4.8				
<i>U. P.</i>											
Rural . . .		598	0.4	777	0.5	804	0.5	758	0.5	712	0.4
Urban . . .		1,366	7.8	1,281	7.5	1,159	7.7	1,189	8.3	1,774	12.1
Total . . .		1,964	1.2	2,058	1.2	1,963	1.2	1,947	1.2	2,486	1.4
<i>Bengal.</i>											
Rural . . .		10,928	8.7	10,103	7.7	8,983	7.6	9,168	7.1	6,711	5.1
Urban . . .		597	8.5	584	8.0	532	8.4	602	8.9	515	8.1
Total . . .		11,525	8.7	10,687	7.7	9,515	7.7	9,770	7.2	7,226	5.2
<i>C. P.</i>											
Rural . . .		3,333	5.3	4,152	6.7	3,112	5.2	3,188	5.8	2,863	4.9
Urban . . .		748	9.8	887	12.2	726	10.9	671	10.4	631	9.8
Total . . .		4,081	5.8	5,039	7.8	3,838	5.8	3,859	6.3	3,494	5.4
<i>Bombay.</i>											
Rural . . .		3,003	4.6	3,916	6.0	3,286	5.5	3,566	5.8	3,078	5.0
Urban . . .		1,178	8.8	1,400	10.7	1,315	10.9	1,421	12.1	1,167	10.3
Total . . .		4,181	5.3	5,316	7.0	4,601	6.4	4,987	6.8	4,245	5.8
<i>Madras.</i>											
Rural . . .		9,876	7.0	12,293	8.3	9,880	6.9	8,593	6.3	8,589	8.4
Urban . . .		2,713	12.1	1,872	14.3	2,761	13.7	2,494	12.9	2,561	13.0
Total . . .		12,589	7.7	14,165	8.7	12,641	7.8	11,087	7.1	11,150	7.3
<i>Coorg.</i>											
Rural . . .		59	15.0	87	23.8	57	16.0	46	13.7	34	12.4
Urban . . .		..	..	1	2.9	2	7.0	2	7.3	1	5.3
Total . . .		59	13.7	88	22.0	59	15.3	48	13.3	35	11.9
<i>Assam.</i>											
Towns over 10,000 and some others.		97	19.8	69	15.7	72	17.0	73	18.1	77	19.1
<i>Burma.</i>											
Urban . . .		435	9.9	435	10.4	379	9.5	434	10.9	454	12.3

\* Number reported by the ordinary agency.

† Number reported on verification of causes of death.

*United Provinces.*—The total of 1,964 recorded maternal deaths included 1,366 in towns having a population of 10,000 or over and 598 in rural districts.

*Bengal.*—The total of 11,525 recorded deaths compared with 10,687 in 1931 and included 597 in towns and 10,928 in rural areas. The figures give a maternal death rate of nearly 9 per 1,000 live-births.

*Central Provinces.*—4,081 deaths were recorded, 748 in towns and 3,333 in rural areas. The Berar division alone registered 1,293 deaths or over

## SECTION III.

## MATERNITY AND CHILD WELFARE.\*

This subject may as before be considered under separate headings.

## (a) Maternity Work and Midwives' training.

43. Various attempts recently made to ascertain more accurately the exact cause of maternal deaths have shown that mortality in connection with child birth is very high and that the problem of maternal deaths is even greater than had been supposed. The lower rate reported for rural areas is probably due to faulty registration, because the facilities for skilled attendance must obviously be lower in the average village even although the general standard of health may be higher. As in the case of infant mortality, the general causes of this high rate are known, although further investigations in particular localities are required, *e.g.*, into the prevalence of anæmia of pregnancy and its influence on maternal mortality and the occurrence of diseases such as osteomalacia and eclampsia which complicate labour in certain parts of India. Apart, however, from such definite entities, which might be susceptible of rapid improvement, the main causes of maternal mortality lie in social customs which cannot be quickly influenced. Any reform, which has as its *modus operandi* an educational process, is bound to operate only gradually, and this fact should be recognised by hygienists and social reformers alike. This should not be taken as implying that we must be content to allow the reform to proceed at its own rate. It can undoubtedly be hastened and, in particular, by the provision of safe attendance at child birth. That means trained midwives and *dais* in far greater numbers than are at present available. Progress in this matter is exceedingly slow and it is even doubtful if it is keeping pace with the increase of the population. On the other hand, there is undoubtedly a greater appreciation of clean midwifery on the part of the general public. It would be a tragedy if this appreciation were not met by increased facilities in the shape of competent midwives. The training of illiterate women is a tedious business, yet the numbers of even partially educated women who are ready to become midwives is still very small, and the ancient prejudice against work which is regarded as "unclean" still lingers. On the one hand, those who are trained tend to demand a wage which their education does not justify and, on the other, the family is unwilling to increase its expenditure even when a mother's life hangs in the balance.

Ante-natal work which is such a powerful factor in reducing maternal mortality is certainly on the increase. A greater number of women's hospitals are taking up this work and health visitors are playing their part. The attendance at ante-natal clinics is better than formerly and the public is beginning to understand the need for careful examinations. This is one cheering aspect in a situation which is otherwise far from reassuring.

---

\* The notes under sub-sections (a), (c) and (f) were again kindly supplied by Dr. Ruth Young, O.B.E., W.M.S., Director, Maternity and Child Welfare Bureau, Indian Red Cross Society, to whom I am much indebted.—A. J. H. R.

### Cerebro-spinal fever.

41. *C. P.*—Five cases with 3 deaths were registered in Nagpur.

*Bombay.*—In addition to the epidemic which occurred in the Shikarpur special prison, this disease prevailed in sporadic form throughout Sind. Of the total of 13 cases with 7 deaths reported, 7 cases and 4 deaths occurred in the Shikarpur special jail, 2 cases in the Sind Convict Gang, Hyderabad, 2 fatal cases in Kambar town, 1 fatal case in Shikarpur town and 1 case in Jamesabad rural circle.

These figures may be taken as a very inadequate and incomplete record of the actual incidence of the disease. There seems little doubt that this infection is much more widespread than actual records would indicate. At the time of writing, cases are being reported from practically every province of India.

### Mysore State.

42. A total of 88,175 deaths were registered, of which 37,842 were attributed to fevers, 7,232 to plague, 3,718 to dysentery and diarrhoea, 3,538 to respiratory diseases, 2,980 to smallpox, 83 to cholera, including 45 in Mysore district alone, and 32,782 to other causes.

The largest number of plague deaths was reported from Mysore district (2,080) and the lowest from Tumkur (369); the peak incidence occurred in January and the minimum in May; inoculations totalled 234,295. Mysore district recorded the largest number of smallpox deaths (1,614); May and January were the months of maximum and minimum incidence. 171 new tubercular cases were treated in the Princess Krishnammanni's sanatorium in Mysore city; of these 23 died. A total of 1,691 lepers were treated in the leper asylum, Bangalore, and in some of the epidemic diseases hospitals.

Anti-malarial operations were continued in Bangalore and Mysore towns; paris-green was used for open water and wells were stocked with Gambusia; the experimental control of malaria by means of paris-green was continued in 3 areas. An examination of 777 children in Mysore city showed a spleen rate of 3.9% as against 11.7% in 1930 and 7.5% in 1927. The hookworm campaign unit in charge of a health officer was at work in the plantations in the districts of Kadur and Hassan. The rural health unit in Mandya taluk of Mysore district carried out 6,029 antiplague inoculations. 11 cases with 2 deaths occurred among the inoculated and 170 cases and 110 deaths among the uninoculated.

### Guineaworm.

37. *C. P.*—71 cases were treated in hospitals and dispensaries. This total included 40 in the Damoh subdivision of Saugor district; 16 in Akola; 13 in Nimar; and 2 in Nagpur district. The disease is reported to be widespread in the rural areas of Damoh subdivision; a few villages in the districts of Nimar, Akola, Wardha and Buldana are also said to be infected.

*Bombay.*—Rao Sahib Y. M. Pradhan, M.C.P.S. (Bombay), writes\* :—

"Among the tropical diseases that cause the most intense and prolonged suffering and misery, guineaworm disease (dracontiasis) occupies a very high place."

"This disease is endemic all over the Bombay Presidency and manifests itself in seasonal epidemics. Gujarat, Konkan and the Deccan are predominantly subject to its ravages. Statistics reveal the fact that on an average 10% of the population in the Colaba district is infected with guineaworm disease during the epidemic season from February to May, the climax being in the month of March."

### Diphtheria.

38. *Punjab.*—Sporadic cases occur every year in the hills and northern districts. It was also reported in the districts of Jhelum, where 31 cases and 12 deaths were recorded; in Attock, 40 and 19; and in Mianwali, 14 and 6.

*C. P.*—Of the 49 cases and 14 deaths recorded, 18 occurred in Wardha, 17 in Nagpur, 9 in Saugor and 5 in Bilaspur. In *Bengal*, the Medical College Hospital provides for the treatment of the disease but cases were also treated in the Presidency General and the Belgachia Medical College Hospitals.

*Bombay.*—109 cases and 30 deaths were recorded in Karachi town. Of these, 97 cases were treated in the epidemic diseases hospital and 19 died.

*Burma.*—Only 12 deaths were registered—4 in Rangoon, 2 in Mandalay and 1 each in Chauk, Allanmyo, Pegu, Bassein, Maubin and Moulmein.

### Typhus.

39. *N.-W. F. P.*—Three cases were reported in Kohat district.

*Burma.*—Four cases occurred in Rangoon, the diagnosis being confirmed by the Weil-Felix reaction with X 19 culture.

### Cancer.

40. *B. & O.*—The radium institute, Patna, treated 721 cases.

*C. P.*—A total of 989 cases with 39 deaths were treated, of which 139 were in the district of Nagpur, 139 in Bilaspur, 112 in Hoshangabad, 90 in Akola and 90 in Buldana.

*Burma.*—Deaths totalled 171 in towns giving a rate of 0.1 p.m. Of these 62 were recorded in Rangoon, 16 in Moulmein, 14 in Mandalay, 6 in Akyab and 6 in Syriam.

---

\* I. J. M. R., Vol. XVIII, No. 2, October, 1930, pages 443-460.

### Filariasis.

34. Under the auspices of the I.R.F.A. an investigation into the distribution of filarial infection has been carried out in recent years in B. & O. The disease has been found to be prevalent, as 14% of the general population have shown the micro-filaria in their blood. The incidence of *F. bancrofti* was found to be the highest in the sea-coast belt, less high in the Gangetic plain and lowest in the sub-montane arable areas. The factors governing a high incidence of endemic filariasis appeared to be (1) a terrain at the sea level; (2) arable land with physical factors capable of yielding a staple crop like paddy; (3) the presence of *Culex fatigans*; (4) urban or suburban populations provided with different systems of drainage; and (5) collections of water in insanitary surroundings. Among drainage systems for the disposal of house water, the cement drain seemed to be of special significance, as those sections of the population which live in areas provided with such drains showed a higher percentage of infection than those residing in areas provided with other systems. In regard to the surgical signs of filariasis, the population of the Gangetic plain showed a higher percentage of scrotal cases whilst terminal infections were more common in the coastal areas. In summing up the situation in B. & O., Dr. Korke, the officer in charge of the investigation, said \* that

"The evidence shows that the prevalence of filariasis is greatest in the urban coastal area where the arable land is such as to yield a rich paddy cultivation. This evidence has a special importance in a large country like India. By studying the physical map of India, one may be able to foretell that filariasis should prevail predominantly in areas like the Coromandel coast, the Northern Circars and the sea-coast belts of Konkan and Malabar; and be less in the Gangetic and the Indus plains which are physiographically on higher level."

Later work in the Punjab and in Sindh has confirmed the above observations inasmuch as no evidence of this disease was found in those provinces.

### Yaws.

35. *Assam*.—This disease has been found to be widely distributed in the sub-montane region of the Kamrup district and in the districts of Goalpara, Nowgong, Garo Hills, Sylhet, Khasi and Jaintia Hills and the Lushai Hills. Treatment was provided in the districts of Nowgong and Goalpara.

*Burma*.—In the Mergui district the special survey staff treated 235 cases between April and May and 114 cases in December, 1932, and January, 1933. As yaws is believed to be very prevalent in the upper reaches of the Tenasserim river, the Mergui district council and the district authorities in Tavoy agreed to extend survey and treatment work to those areas. In Mandalay district, cases were found in the villages of Singu township and arrangements were being made to provide for their treatment. In Lower Chindwin district, it was said to be prevalent in Kani township and sporadic in Yinmabin township. In the Chin Hills, 83 cases were treated in hospitals.

### Goitre.

36. *Burma*.—Goitre is said to be widely prevalent in the districts of Pakokku, Katha and Bhamo.

---

\* I. J. M. R., Vol. XVIII, No. 1, July, 1930.

*Punjab*.—Only sporadic cases occurred in the districts of Amritsar, Sheikhupura, Rawalpindi, Mianwali and Montgomery. Hospital and dispensary returns show 167 cases in Ludhiana district, 62 in Gurgaon, 30 in Rohtak, 25 in Lahore, 21 on railways, 14 in Sialkot, 12 in Hissar and 11 in Attock.

*U. P.*—243 deaths were recorded, 187 in rural and 56 in urban areas, but judging from the data supplied by the verification agency the actual number of deaths is estimated at 1,142. Of the rural deaths, 127 were reported in Nainital district alone. In urban areas, 13 deaths were recorded in Benares and 13 in Kashipur in Nainital district.

*B. & O.*—Hospital and dispensary returns indicated that the highest incidence was in Patna district where 223 cases were recorded. Figures for other districts were—Shahabad 93, Gaya 81, Bhagalpur 70, Monghyr 40, Puri 36, Ranchi 35, Saran 29, Darbhanga 29, Hazaribagh 23, Palamau 16, Champaran 12 and Purnea 10.

*Bengal*.—4,357 deaths were recorded, of which 4,337 were in rural and only 20 in urban areas. Of the total cases treated in hospitals and dispensaries, 643 were in Calcutta. Districts reporting high figures were Hooghly 777 cases, Rajshahi 291, Murshidabad 27, Dacca 259, 24-Parganas 117 and Faridpur 100.

*C. P.*—Cases treated in hospitals and dispensaries totalled 128 as against 426 in 1931. The largest numbers were recorded in the districts of Wardha (50), Chhindwara (20), Jubbulpore (13) and Hoshangabad (13).

*Bombay*.—Only 2 deaths were recorded, 1 in Bombay city and 1 in Rander town; 184 cases were treated in hospitals and dispensaries.

*Madras*.—Cases treated in hospitals and dispensaries included 304 in Chingleput district, 244 in Vizagapatam, 157 in West Godavari, 130 in Ganjam, 74 in North Arcot and 63 in East Godavari.

*Assam*.—No cases were reported.

*Burma*.—No deaths were recorded in towns and figures for rural areas are not available.

### Influenza.

33. No serious epidemic occurred although in some of the provinces mild outbreaks were reported. In the *Punjab* 3,555 cases and 13 deaths were registered in 7 districts. The D. P. H. remarks—

"It is now becoming increasingly clear that influenza must be regarded as an endemic disease of the Punjab and that it is apt to prevail with variable intensity during the winter in the plains and during the spring and summer in the hill tracts."

In the *C. P.*, the disease prevailed in a mild form in most districts and 49,975 cases with 29 deaths were treated in hospitals and dispensaries. Nagpur recorded 10,475 cases, Jubbulpore 7,014, Amraoti 4,513, Yeotmal 3,253, Buldana 3,096 and Nimar 3,056. In *Bombay*, 168 deaths were recorded of which 71 occurred in Bombay city. In *Burma*, although this disease is not notifiable in rural areas, localised severe outbreaks were reported in the districts of Insein, 80 cases; Myingyan 300 cases with 34 deaths; and the Chin Hills. Of the towns, Allanmyo (1.7 p.m.) recorded the highest death rate.



TABLE II (lvi)—*contd.*

Districts.	Cases treated.						
	1932.	1931.	1930.	1929.	1928.	1927.	1926.
<b>Total</b>	<b>11,958</b>	<b>9,759</b>	<b>16,430</b>	<b>23,804</b>	<b>23,576</b>	<b>33,415</b>	<b>49,385</b>
Cachar	391	285	376	470	394	359	333
Sylhet	4,719	4,017	6,726	9,162	8,988	10,527	16,355
Goalpara	1,089	741	1,439	2,389	2,316	3,495	5,671
Kamrup	2,061	1,430	1,814	2,598	3,577	6,445	7,301
Darrang	665	734	1,106	1,390	2,228	4,053	4,414
Nowgong	1,075	879	1,440	2,433	2,614	5,008	9,586
Sibsagar	1,269	879	1,495	2,387	1,555	1,521	2,658
Lakhimpur	12	3	23	23	28	19	20
Khasi and Jaintia Hills	..	..	..	..	6	120	198
Naga Hills	16	5	21	9	5	1	2
Lushai Hills	2	..	..	..	1	..	..
Garo Hills	605	746	1,905	2,905	1,690	1,828	2,812
Sadiya Frontier Tract	1	2	2	3	8	3	4
Manipur State	53	38	83	35	166	36	31

*Other provinces.*—Only 160 cases were treated in Burma; in Punjab 86; in Delhi and C. P. 12 each; and in Bombay 3. N.-W. F. P. and Coorg had no cases.

### Relapsing Fever.

32. Table II (lvii) gives the numbers of cases treated in medical institutions.

TABLE II (lvii).

	1932.	1931.
<b>Total</b>	<b>6,200</b>	<b>7,869</b>
N.-W. F. P.	33	43
Punjab	401	309
Delhi	18	20
U. P.	412	464
B. & O.	709	512
Bengal	3,053	3,693
C. P.	128	426
Bombay	184	203
Madras	1,141	2,019
Coorg	..	..
Assam	..	3
Burma	62	174
Baluchistan	59	3

*N.-W.F.P.*—Of the total, 14 cases were treated in Peshawar district, 13 in D. I. Khan, 4 in Kurram Agency and 1 each in Hazara district and North Waziristan.

TABLE II (lv)—*contd.*

	1929.	1930.	1931.	1932.
Dinajpur . . . . .	3,703	2,730	2,992	<b>3,715</b>
Rangpur . . . . .	5,436	3,479	3,356	<b>3,433</b>
Faridpur . . . . .	4,318	3,053	3,205	<b>3,258</b>
Mymensingh . . . . .	5,325	4,620	3,621	<b>3,181</b>
Burdwan . . . . .	2,648	3,340	3,407	<b>2,373</b>
Hooghly . . . . .	3,622	3,760	3,249	<b>2,339</b>
Chittagong . . . . .	1,401	1,411	1,751	<b>1,780</b>
Bogra . . . . .	1,167	876	1,758	<b>1,655</b>
Pabna . . . . .	3,752	2,376	2,748	<b>1,496</b>
Midnapore . . . . .	1,217	1,179	1,258	<b>1,097</b>
Jalpaiguri . . . . .	1,148	1,091	748	<b>795</b>
Howrah . . . . .	1,808	1,207	955	<b>765</b>
Darjeeling . . . . .	450	342	356	<b>653</b>
Bankura . . . . .	66	100	138	<b>101</b>
Birbhum . . . . .	44	64	54	<b>63</b>

*Madras*.—Of 6,519 cases treated in hospitals and dispensaries, 1,547 were recorded in Madras city. Districts recording high figures were Tinnevely 2,685 cases, Malabar 842, Cuddapah 447, Nellore 234, Ramnad 210, N. Arcot 132 and Chittoor 110.

*Assam*.—Intensive detailed surveys were continued for the detection of new cases. Villages within a certain radius of dispensaries in infected districts were surveyed by the M. Os. in charge, whilst a special staff of sub-assistant surgeons was deputed for the purpose in other places where recrudescence was anticipated. Table II (lvi) gives the figures of recorded deaths and cases treated by the P. H. Department during the period 1926-32.

TABLE II (lvi).

Districts.	Deaths.						
	1932.	1931.	1930.	1929.	1928.	1927.	1926.
<b>Total</b>	<b>978</b>	<b>1,017</b>	<b>953</b>	<b>1,405</b>	<b>1,660</b>	<b>2,859</b>	<b>4,176</b>
Cachar . . . . .	4	4	2	3	2	12	9
Sylhet . . . . .	296	246	274	429	482	798	1,320
Goalpara . . . . .	122	121	112	135	166	226	297
Kamrup . . . . .	152	160	102	180	241	475	714
Darrang . . . . .	155	222	185	241	258	318	474
Nowgong . . . . .	132	129	132	178	260	528	839
Sibsagar . . . . .	78	71	58	87	86	143	170
Lakhimpur . . . . .	2	..	2	1	5	5	1
Khasi and Jaintia Hills	..	..	..	..	4	3	4
Naga Hills . . . . .	1	..	1	1	..	..	..
Lushai Hills . . . . .	1	..	..	..	1	..	1
Garo Hills . . . . .	43	64	84	149	154	350	346
Sadiya Frontier Tract	1	..	..	1	1	1	1
Manipur State . . . . .							

*Assam*.—2,123 cases of gonorrhoea and 673 cases of syphilis were treated in hospitals and dispensaries in Sylhet district and 669 and 230 in Kamrup district.

*Burma*.—Free treatment continued to be provided at clinics in 28 headquarters hospitals but, owing to the withdrawal of special contributions by Government, the free treatment of syphilis by arsenical preparations was curtailed.

### Kala-azar.

31. *U.P.*—Of a total of 232 recorded deaths, 161 were in rural and 71 in urban areas. Among rural districts, Pilibhit reported 33 deaths, Benares 32, Fyzabad 23, Gorakhpur 18 and Allahabad 15. Of the towns, Bijnor recorded 24, Balrampur 24 and Benares 10.

*B.&O.*—A total of 55,344 cases was treated in hospitals and dispensaries as against 56,274 in 1931. District figures included Saran 13,070, Darbhanga 10,459, Muzaffarpur 8,739, Purnea 7,897, Champaran 4,285, Patna 3,519, Monghyr 2,842, Bhagalpur 2,102 and Shahabad 967. The local Government continued its grant of Rs. 7,500 for the purchase of special drugs for treatment. This amount was distributed mainly among the *sadr* and sub-divisional hospitals in Bihar where the disease is very prevalent. A scheme for investigation of the spread of this disease was under preparation. The local government contributed a sum of Rs. 6,000 towards kala-azar research.

*Bengal*.—10,720 deaths were registered as against 10,914 in 1931 and the death rate was 0.2 p.m. Of the 646 deaths in towns, Calcutta recorded 241 and Dacca 102. The rural total of 10,074 deaths included 1,844 in Tippera, 1,463 in Dinajpur, 902 in Dacca, 858 in Mymensingh, 594 in Noakhali, 530 in Faridpur, 486 in 24-Parganas, 435 in Rangpur, 330 in Malda and 311 in Bogra. The death rate was 0.2 p.m. both in rural and urban areas. The local Government contributed Rs. 6,000 towards kala-azar research. Table II (iv) gives the numbers of cases treated in hospitals and dispensaries in the different districts.

TABLE II (iv).

	1929.	1930.	1931.	1932.
<b>Total</b>	<b>114,845</b>	<b>110,017</b>	<b>101,151</b>	<b>105,840</b>
Rajshahi	11,921	11,675	9,681	11,026
Murshidabad	2,696	3,947	5,737	9,309
Malda	3,494	4,173	5,326	9,075
Dacca	6,098	5,403	5,980	7,290
24-Parganas	14,384	11,302	9,155	5,873
Khulna	3,183	3,724	4,813	5,717
Jessore	5,563	4,807	5,014	5,655
Nadia	7,845	6,824	6,549	5,415
Bakarganj	6,008	3,963	4,588	5,334
Tippera	4,849	4,638	5,334	5,015
Calcutta	10,640	6,922	6,322	4,764
Noakhali	2,419	3,011	2,726	4,683

times a year and during the last decade 72 doctors have taken this course. A total of 3,416 cases were treated at the clinic including 2,728 males and 688 females; syphilis cases numbered 876, gonorrhoea 1,709 and non-syphilitic chancres 831. Stock gonococcal vaccines prepared from strains collected in the dispensary and autogenous vaccines for secondary organisms are prepared in the laboratory and used in the treatment of cases.

*Madras.*—The venereal department of the Government General Hospital, Madras, in charge of a "V. D." specialist, treated 6,846 cases and sent 7,224 specimens of blood and 114 specimens of cerebro-spinal fluid to the King Institute, Guindy, for serological examinations. The bacteriological work done in the special department of the hospital included 5,803 examinations of smears for gonococci and 2,034 dark ground examinations for spirochaetes.

Venereal clinics were at work in the headquarter hospitals at Coimbatore, Cuddapah, Masulipatam, Madura, Calicut, Nellore and Tanjore; in the women and children's hospitals, Calicut and Negapatam; and in the government hospital, Rajahmundry. 19 members of the government medical staff are now specially qualified in the diagnosis and treatment of "V. D."

Table II (liv) gives cases treated in each district.

TABLE II (liv).

	Gonococcal infection.	Syphilis.	Total.
Ganjam . . .	2,245	2,591	4,836
Vizagapatam . . .	3,710	3,948	7,658
Vizagapatam Agency . . .	919	558	1,477
Godavari East . . .	6,135	8,274	14,409
Godavari West . . .	2,639	3,955	6,594
Kistna . . .	4,385	3,565	7,950
Guntur . . .	10,031	12,572	22,603
Nellore . . .	3,010	3,680	6,690
Chittoor . . .	4,381	2,607	6,988
Bellary . . .	1,490	1,867	3,357
Anantapur . . .	1,579	1,591	3,170
Cuddapah . . .	3,579	3,761	7,340
North Arcot . . .	4,912	6,906	11,818
Kurnool . . .	2,247	3,086	5,333
Madras City . . .	8,738	6,062	14,800
Chingleput . . .	2,021	2,018	4,037
South Arcot . . .	2,502	3,340	5,842
Salem . . .	2,366	353	2,721
Coimbatore . . .	4,046	3,914	7,960
Trichinopoly . . .	3,526	3,078	6,604
Tanjore . . .	5,805	6,033	11,838
Madura . . .	6,225	5,829	12,054
Ramnad . . .	3,732	2,820	6,552
Tinnevely . . .	2,156	2,215	4,371
Malabar . . .	4,771	5,227	9,998
The Nilgiris . . .	443	410	853
South Kanara . . .	1,356	1,970	3,326

treatment facilities are generally available at all medical institutions. The largest numbers were treated in the districts of Raipur (5,147), Bilaspur (4,135) and Nagpur (3,718). The I. G. C. H. remarks—

“These figures do not indicate the real state of the prevalence of these diseases as, for obvious reasons, a large percentage of those affected do not attend public hospitals for relief.”

Owing to financial stringency, no grants were given for free treatment of the poor.

TABLE II (liii).

	Gonococcal infection.	Syphilis.	Total.
Patna .	2,398	3,295	5,693
Gaya .	892	2,189	3,081
Shahabad	1,278	1,850	3,128
Saran .	2,745	5,200	7,945
Champaran	2,719	4,023	6,742
Muzaffarpur	1,459	3,177	4,636
Darbhanga	2,294	5,002	7,296
Monghyr	1,469	2,454	3,923
Bhagalpur	950	2,023	2,973
Purnea .	921	1,538	2,459
Cuttack	1,601	2,181	3,782
	917	1,347	2,264
Balasore	716	897	1,613
Angul .	221	746	967
Puri .	879	1,316	2,195
Sambalpur	1,292	910	2,202
Hazaribagh	724	819	1,543
Ranchi .	456	390	846
Palaman . . . . .	637	625	1,262
Manbhum . . . . .	2,400	1,321	3,721
Singhbhum . . . . .	1,838	1,451	3,289

*Bombay.*—Government employs a “V. D.” specialist for the Presidency as a whole and other qualified staff for the treatment of these includes a surgeon and 2 honorary clinical assistants in the J. J. Hospital, Bombay, and honorary venereologists in the St. Georges’ Hospital, Bombay, and civil hospitals Hyderabad (Sind) and Karachi. In addition to municipal centres and 4 special treatment centres in Bombay city, treatment is provided in all civil hospitals in the Presidency. Of the total, 5,878 cases of gonococcal infection and 6,420 cases of syphilis were treated in the Konkan, including 4,800 and 5,205, respectively, in Bombay city; 4,694 and 8,456 in the Deccan; 1,931 and 3,302 in Gujerat and 4,194 and 8,133 in Sind. The remaining cases were reported from the Persian Gulf and from state-special, railway and private non-aided institutions.

In Bombay city the league for combating “V. D.” continued to maintain an information bureau and a clinic in charge of a medical officer. In addition, the staff at the clinic included a woman doctor, a nurse, a laboratory assistant and 2 clinical assistants. Under the auspices of the league, a post-graduate course for the training of medical practitioners in “V. D.” is held 3

Treatment centres.	Day and hours open.	Remarks.
<i>Rangoon.</i>		
General Hospital . . .	7 A.M. to 12 noon 3 P.M. to 5 P.M.	} Week days.
<i>Bassein.</i>		
General Hospital . . .	8 A.M. to 11 A.M. 3 P.M. to 5 P.M.	} Week days.
<i>Moulmein.</i>		
General Hospital . . .	8 A.M. to 12 noon 3 P.M. to 5 P.M.	} Week days.

The following sub-paragraphs give additional information in regard to facilities for the treatment of "V. D." in the general population:—

*N.-W. F. P.*—119 medical officers, including 3 women doctors, have so far been trained in the diagnosis and treatment of "V. D." Special arrangements for treatment have been made at the Lady Reading Provincial Hospital, Peshawar, whilst general treatment clinics totalled 93. Judging from the numbers treated in hospitals and dispensaries, the incidence of syphilis is higher than that of gonococcal infection. In Peshawar district, syphilis cases totalled 2,340; in Dir, Swat and Chitral Agencies 1,294; in Hazara 561; in Kurram Agency 534; and in Bannu 435.

*Punjab.*—The "V. D." department in the Mayo Hospital, Lahore, is in charge of a qualified medical officer. Of the total government medical staff, only 2 are specially qualified in the diagnosis and treatment of these diseases. Large numbers of cases were treated in the hospitals and dispensaries of the districts of Lahore, Ambala, Ferozepore, Karnal, Amritsar and Hissar.

*Delhi.*—Delhi municipality continued to arrange for free treatment at a cost of Rs. 1,172; but patients treated decreased from 7,412 to 5,453. The A.D.P.H. remarks that these diseases are undoubtedly more prevalent in the urban than in the rural areas.

*U. P.*—Arrangements for treatment of "V. D." cases exist only in the out-patient dispensary of the Medical College Hospital, Lucknow.

*B. & O.*—Government continued to make special grants of Rs. 5,000 for the purchase of arsenical preparations for treatment at the *sadr* and sub-divisional headquarter hospitals in charge of assistant surgeons. Table II (liii) gives the cases treated in each district.

*Bengal.*—Two special treatment centres were at work but general "V. D." clinics existed in all hospitals. Of the total, 13,553 cases of gonococcal infection and 13,067 of syphilis were treated in Calcutta; 13,176 and 7,274 in Dacca division; 6,914 and 6,727 in Burdwan division; 5,802 and 4,376 in the Presidency division; 4,469 and 2,889 in Rajshahi division; and 4,110 and 1,586 in Chittagong division.

*C. P.*—Approximately 60 assistant medical officers have so far attended the post-graduate course of training at the Mayo Hospital, Nagpur, and

India has not yet become a party to the Brussels' Agreement of 1924 which provides facilities for the free treatment of "V. D." among merchant seamen; but the Government of India has co-operated as far as possible by carrying out most of the requirements of that Agreement. Centres for treatment now exist at Bombay, Karachi, Calcutta, Chittagong, Madras, Rangoon, Bassein and Moulmein and the arrangements made at these centres are listed below.

Treatment centres.	Days and hours open.	Remarks.
<i>Calcutta.</i>		
1. Presidency General Hospital	9 to 11 A.M. } Every day, except Sundays.	<i>Nil.</i>
2. Howrah General Hospital	2 to 5 P.M. } Outpatients department open on Mondays, Tuesdays, Thursdays and Fridays from 10 A.M. onwards. Indoor open day and night.	
3. Medical College Hospitals	8 A.M. to 11 A.M. every day except Sunday.	Open to Indian and European males, outdoor cases only.
<i>Chittagong.</i>		
Chittagong General Hospital	8 A.M. to 10 A.M.	Salvarsan injections every Wednesday; bismuth injections every Saturday.
<i>Madras.</i>		
Government General Hospital	8 A.M. to 1 P.M. every day except Sunday. 8 A.M. to 11 A.M. on Sunday.	
<i>Bombay.</i>		
1. J. J. Hospital (Outdoor Department), Parel Road, Byculla.	9-30 A.M. to 11-30 A.M. daily.	
2. Municipal Anti-venereal Clinic, 254, Bellasis Road, opposite Post Office, Byculla.	8 to 12 noon and 4 P.M. to 7 P.M. daily.	
3. King Edward VII Memorial Hospital, Parel.	8 A.M. to 10 A.M. daily.	
4. Gokuldas Tejpal Hospital, Carnak Road, Fort.	9 A.M. to 12 noon daily.	
5. Yarnunabai L. Nair Charitable Hospital, North Jetha Street, Lamington Road, Byculla.	8-30 A.M. to 9-30 A.M. daily.	
6. St. George's Hospital, Bori Bunder, Fort.	9 A.M. to 12 noon daily.	
7. Parsee General Hospital, B. Petit Road, Cumballa Hill.	9 A.M. to 12 noon daily.	
<i>Karachi.</i>		
Civil Hospital, Karachi	9 A.M. to 12 noon daily	This Centre is situated at a distance from the Port.

and of 438 cases in rural areas, 629 and 380, respectively, were sent for treatment. Of these, 882 survived and 5 died; the condition of the others was unknown.

*Bombay*.—The districts of Kaira (28 deaths), Ahmedabad (22), Surat (16) and Ahmednagar (14) recorded the largest numbers of deaths.

*U. P.*—Balrampur town reported 33 deaths; of the rural areas, the districts of Gorakhpur (31), Saharanpur (30) and Ballia (20) reported the largest numbers.

*Madras*.—The rural districts of Nellore (33), Guntur (28), Tanjore (28), North Arcot (27), West Godavari (27) and South Arcot (28) recorded the largest number of deaths.

*Burma*.—The urban total included 15 deaths in Rangoon, 7 in Mandalay and 6 in Danubyu; among rural areas the districts of Shwebo (44), Minbu (23), Lower Chindwin (21) and Meiktila (18) reported the largest number of deaths.

*B. & O.*—44 deaths were registered in the rural district of Cuttack, 18 in Darbhanga and 10 in Muzaffarpur.

#### Venereal Diseases.

30. Although statistics of the incidence of "V. D." are not recorded for the general population, accurate returns are maintained for both the British and Indian Armies and for the jail population and a reference to Vol. II of this report will show that venereal infections are widely disseminated. As regards the general population, fairly reliable statistics of attendances at hospitals and dispensaries are available. Table II (lii) gives the numbers of cases treated in these institutions in different provinces during the years 1931 and 1932. These figures of course relate to a selected group of the population.

TABLE II (lii).

	1931				1932			
	unococ infectio	Syp	total		Gon inf	Syp	Tot	
Total	293,698	338,106	631,804	0.9	289,268	343,348	632,616	0.9
N.-W. F. P.	1,646	4,881	6,527	0.4	1,364	5,693	7,057	0.4
Punjab	14,221	17,851	32,072	0.2	13,608	18,446	32,054	0.2
Delhi	5,210	7,207	12,417	1.3	6,101	7,732	13,833	1.3
U. P.	22,971	37,054	60,025	0.7	25,566	38,700	64,266	0.8
B. & O.	28,704	41,205	69,909	0.9	28,806	42,754	71,560	1.0
Bengal	47,018	34,964	81,982	0.8	48,025	35,921	83,946	0.9
C. P.	13,060	17,848	30,908	0.9	13,734	18,015	31,749	0.9
Bombay	24,518	36,057	60,575	1.9	24,876	37,791	62,667	1.2
Madras	108,177	105,820	213,997	1.4	98,951	104,230	203,181	1.3
Coorg	437	331	768	0.3	353	202	555	0.2
Assam	5,018	2,206	7,224	0.3	4,951	2,265	7,216	0.3
Burma	21,605	30,709	52,314	1.8	22,144	30,524	52,668	1.7
Baluchistan	1,113	1,973	3,086	0.4	789	1,075	1,864	0.2



*Burma.*—The special leprosy officer carried out surveys of Minbu, Meiktila and Hlegu health unit. In Minbu district, 347 cases were discovered out of 9,499 persons examined; this figure gave an incidence of 17.8 p.m. examined as compared with the census rate of 1.14 p.m.

Leprosy clinics were started at Minbu, Salin, Sinbyugyun, Sagu and Pwinbyu. In Meiktila district, the survey revealed an incidence of 16.6 p.m. of persons examined. In this district clinics were opened at Mahlaing, Meiktila and Thazi; in Hlegu the incidence rate, as revealed by the survey, was 13.9 p.m., the average attendance numbering 40.

The D. P. H. makes interesting observations on this subject:—

"The incidence of leprosy in the 3 areas surveyed, which gave an average of 16.49 per 1,000 population examined, gives some idea of the size of the leprosy problem in Burma and at the same time emphasises the necessity for active and effective measures in dealing with it. It is not suggested that the ratio per 1,000 of the people examined applies to the population of the whole province. If it did, it would give a total of 241,537 lepers in Burma. What the surveys have shown is that the census figure of 0.76 per 1,000 population in no way represents the incidence of the disease."

The leper colony, Monywa, which is maintained by contributions from the district council, the municipal committee, the provincial branch of the B. E. L. R. A. and private donations, has 6 cottages with accommodation for 48 cases, 24 males and 24 females. The number of inmates varied between 41 and 50; and a total of 121 cases were treated at the government clinic. 13 lepers were detected by the port health staff at Rangoon in vessels arriving from Indian ports; of these 4 were sent to a leper asylum.

### Rabies and Hydrophobia.

29. Table II (li) gives the number of deaths from rabies in the rural and urban areas of British India and the provinces.

TABLE II (li).

	Deaths.			Deaths 1931.
	Rural.	Urban.	Total.	
<b>Total . . . .</b>	<b>2,035</b>	<b>418</b>	<b>2,453</b>	<b>2,457</b>
N.-W. F. P. . . . .	..	1	1	5
Punjab . . . . .	100	30	130	95
Delhi . . . . .	..	1	1	2
U. P. . . . .	290	71	361	530
B. & O. . . . .	146	11	157	216
Bengal . . . . .	500	60	560	580
G. P. . . . .	145	29	174	168
Bombay . . . . .	145	29	174	143
Madras . . . . .	423	115	538	456
Coorg . . . . .	..	..	..	..
Assam . . . . .	51	3	54	52
Burma . . . . .	235	68	303	210
Ajmer-Merwara . . . . .	..	..	..	..

*C. P.*—Of the cases treated at various centres, Nagpur had 543, Jubbulpore 522, Hoshangabad 23, Raipur 377 and Akola 142. District reports show that of a total of 738 dog-bite or other bite cases recorded in municipalities

and 746. The assistant M. Os. treated a total of 57,372 cases in 17 station house areas and conducted 1,225 sedimentation and 972 Kahn's tests with 353 positive results. The 8 asylums treated a total of 2,033 cases, of which 1,558 were old cases and 475 new admissions; 368 died or were discharged; 1,613 were treated as outdoor cases.

Cases treated in the districts of Raipur numbered 1,770, Nagpur 252, Bilaspur 205, Yeotmal 120 and Nimar 117.

The province had 10 assistant surgeons, 66 assistant M. Os. and 16 private medical practitioners trained in modern methods of diagnosis and treatment. Owing to financial stringency no grants were made by government for the treatment of pauper lepers in the main hospitals.

*Bombay.*—Of the total, 1,292 cases were treated in the Deccan districts; 1,311 in the Konkan; 198 in Gujerat; 148 in Sind; 5 in Persian Gulf; and 758 in state-special, railway and private non-aided institutions.

*Madras.*—In view of the successful working of the "group leprosy scheme", its continuance, under the direction of the Surgeon General, was sanctioned for a further period of two years. The P. H. Department assisted in surveys and with propaganda work, and a number of medical officers, especially those in charge of clinics, were trained in the modern methods of treatment. The number of institutions for the treatment of leprosy increased from 85 to 239; in Salem the number rose from 5 to 31 owing to an intensive campaign organised by social workers in that district; clinics increased from 76 to 196. Of the 53,497 lepers detected by the surveys, 26,963 were said to be under treatment. With a view to giving greater facilities to government servants for treatment, the government have recognised 14 additional medical institutions as treatment centres.

7,532 cases were treated in North Arcot district; 4,273 in East Godavari; 4,979 in Chingleput; 5,513 in Salem; 3,093 in Madura; 3,180 in South Arcot; 2,893 in Malabar; 2,192 in Vizagapatam; 1,961 in Tanjore; 1,554 in West Godavari; and 1,096 in Madras town.

*Assam.*—With grants aggregating Rs. 2,500 from the Assam Leprosy Relief Committee and Rs. 2,000 from the provincial branch of the Indian Red Cross Society, treatment was available at 39 public health dispensaries under the charge of trained doctors. These included 16 in Sylhet, 3 in Goalpara, 4 in Kamrup, 8 in Nowgong, 4 in Darrang and 4 in Sibagar. Up to May, 1933, the numbers treated totalled 1,142 of which 201 were treated in Sylhet and 120 in Kamrup. Sub-assistant surgeons on kala-azar duty continued to carry out leprosy survey work. Outpatient clinics were available at all the *sadr* and sub-divisional headquarters hospitals and at some of the more important outlying dispensaries. In Kamrup district, sub-assistant surgeons of the P. H. Department were trained at the Gauhati hospital. The scheme for a leper hospital at Jorhat remained in abeyance. 70 new cases were admitted to the leper asylum, Sylhet, the leper hospital, Kohima, the leper colony, Tura and the leper ward, Dhubri. Of these only 4 were discharged cured and 11 died. One sub-assistant surgeon and one health officer received special training at Calcutta.

The provincial leprosy relief committee made a substantial contribution towards the cost of erecting leprosy sheds in out-centres.

A complete list of leprosy institutions at work in different provinces and Indian States will be found on pages 372 to 375.

*N.-W. F. P.*—The Indian Council of the B. E. L. R. A. continued its contribution of Rs. 600 for anti-leprosy work. Of the total, 46 cases were treated in Peshawar district alone.

*Punjab.*—Of the total, 498 cases were treated in Kangra district alone. Survey work was continued in this district under the auspices of the B. E. L. R. A. and 14 clinics are now at work there. A survey of the endemic areas detected 900 cases. A whole-time medical officer was appointed to the charge of the Palampur leper hospital. The special leprosy officer detected 440 cases in 205 villages out of 1,057 surveyed. In these areas, 6 treatment centres were opened. The asylums at Ambala, Sabathu, Palampur, Taran Taran and Rawalpindi were maintained for the most part by government grants aggregating Rs. 56,743; those at Taran Taran and Rawalpindi provide separate accommodation for untainted children, etc.

*U. P.*—Arrangements for treatment exist at most of the hospitals and also at the skin dispensaries at Cawnpore (129 cases), Benares (149) and Lucknow (355). It was proposed to close the asylum at Roorkee.

*B. & O.*—Although owing to financial stringency the post of leprosy expert and the leprosy survey party were abolished from March, 1932, 45 clinics were at work and these treated a total of 9,697 cases. The 6 asylums and 2 colonies with accommodation for 2,079 cases were maintained; these treated 1,999 indoor and 2,504 outdoor patients as against 1,647 and 3,818 in 1931.

Total cases treated included 2,002 in Puri; 1,502 in Saran; 1,434 in Palamau; 827 in Santal Parganas; and 713 in Muzaffarpur.

*Bengal.*—Of the total, 1,833 cases were treated in the districts of Burdwan division; 1,090 in the Presidency division; 606 in Rajshahi division; 544 in Dacca division; and 90 in Chittagong division.

In Calcutta, 1,418 outdoor and 12 indoor cases were treated in the general hospitals. The ward for insane lepers in the Albert Victor hospital had accommodation for 8 patients and 7 cases were treated.

In the *mufassal* institutions, cases treated totalled 4,163. In addition 862 indoor and 679 outdoor cases were treated in the special leper hospitals at Gobra (Calcutta), at Raniganj and Bankura. The cost of upkeep of these institutions amounted to Rs. 80,111, of which government contributed Rs. 57,400.

*C. P.*—Anti-leprosy operations were curtailed owing to the abolition of 3 residuary and 9 dispensary centres from August, 1932, and thereafter only 14 residuary and 6 dispensary centres were at work in the province although the number of subcentres rose to 24 from 22 in 1931. The 3 assistant M. Os. whose services were available on the closure of the residuary centres were employed on propaganda and survey work in dispensary centres at Arang, Bhatapara, Baloda-Bazar, Drug Balod and Champa where 764 fresh cases were detected. Attendances at the 17 residuary centres totalled 34,402, those at the 22 dispensary centres including the 7 leprosy fund centres rose from 23,695 in 1931 to 31,069. Symptom-free and improved cases numbered 202

*Punjab*.—Preventive and curative measures were carried out at the cost of the district board in *Tehsil* Shakargarh of Gurdaspur district where the infection is most prevalent. The results obtained were encouraging.

*C. P.*—Investigations into the prevalence and the treatment of hookworm were continued in Jubbulpore, Raipur, Nagpur, Narsinghpur, Akola and Amraoti jails.

*Madras*.—The rural sanitation campaign referred to in previous reports was continued. The 2 school units were abolished as a measure of economy but the 6 rural sanitation units were at work in the districts of Madura, Coimbatore, Salem, South Arcot, Kistna and Vizagapatam. As in previous years, this campaign concentrated on propaganda, the prevention of soil pollution, mass treatment and the provision of village latrines.

Cinema shows, lantern lectures and talks were given to audiences totalling nearly 5 lakhs. A total of 164,588 treatments for hookworm were given, these including 14,858 given by the rural sanitation field units. No less than 1,884 additional bore-hole latrines were constructed during the year, for the most part in Madura district where the district board have spent the large sum of Rs. 28,200 within recent years on soil sanitation. Other bodies which deserve mention in the same connection are the district, taluk and *panchayat* boards of the districts of Coimbatore (Rs. 10,167), Salem (Rs. 11,475), East Godavari (Rs. 5,958), South Arcot (Rs. 5,275), Ramnad (Rs. 3,250) and Kistna (Rs. 1,210).

The researches into the longevity of hookworm in man and the efficacy of the drugs used for treatment were continued. These showed that the hookworm has a longer life in the human intestine than that previously reported by Dr. Asa Chandler and other workers.

### Leprosy.

28. Table II (1) gives the numbers of cases treated in hospitals and dispensaries. The warning must once more be given that these numbers give little indication of either the actual or the relative incidence of leprosy in the different provinces.

TABLE II (1).

		Cases.			Rate per 10,000 of total hospital cases.		
		1930.	1931.	1932.	1930.	1931.	1932.
Total		57,480	68,776	81,083	8.0	9.5	11.0
N.-W. F. P.		24	30	54	0.2	0.2	0.3
Punjab		247	237	725	0.2	0.2	0.5
Delhi		66	81	63	0.7	0.8	0.6
U. P.		5,590	5,843	7,013	6.9	7.2	8.6
B. & O.		10,108	9,368	10,985	13.3	12.3	15.1
Bengal		3,904	4,503	5,593	4.1	4.7	6.0
C. P.		2,538	3,378	2,954	7.3	9.7	8.4
Bombay		3,299	3,789	3,712	5.9	6.8	6.8
Madras		28,272	38,661	46,749	18.4	25.1	29.2
Coorg		4	1	1	0.2	..	..
		847	634	451	3.5	2.7	1.9
Burma		2,575	2,238	2,766	8.7	7.6	9.1
Baluchistan		6	13	17	0.1	0.2	0.2

*Bengal*.—In Calcutta, cases treated rose from 1,854 to 3,247; in the mufasal also the incidence rose from 1,349 in 1931 to 5,436. The disease was confined chiefly to the Presidency Division with 2,857 cases; other divisional cases were Burdwan 1,451 cases against 531 in 1931; Dacca 1,069 against 247 in 1931; Chittagong 58; and Rajshahi 37 against 260 in 1931.

*Madras*.—The districts of Kistna (4,631), East Godavari (3,883), Guntur (2,979) and West Godavari (1,637) reported the largest numbers of cases treated. These figures coincide with the survey made some years ago which indicated that this north-east area of the Presidency constituted an endemic centre for beri-beri.

*Assam*.—An outbreak of the epidemic dropsy type of beri-beri occurred at Gauhati; a milder outbreak was also recorded in Shillong. The cause of these outbreaks was not traced.

*Burma*.—Beri-beri is believed to be prevalent in the rural districts of Upper Chindwin, Kyaukpypu, Toungoo and Mergui. The use of dry yeast in the first two districts gave encouraging results; in Mergui the Telegu cooly, who subsists on a very low diet, was chiefly affected.

Of the 171 recorded deaths in urban areas, 98 occurred in Rangoon, 11 in Mergui; 8 in Akyab; 6 in Bassein; and 5 each in Syriam and Toungoo. In Rangoon, 81 of the deaths were amongst Hindus; 8 in Muhammedans and Malays; 6 in Budhists; and 2 among Christians. In Syriam, all the 19 cases treated in the local hospital were found to be undernourished and in Toungoo the 21 recorded cases were mostly from *mahouts* working in the local forests. In Myitkyina, the disease chiefly occurred among the poorest classes of Chinese coolies.

#### Ankylostomiasis.

27. Table II (xlix) gives the numbers of cases treated in British India and in the different provinces. Much the highest number of patients was recorded in Madras Presidency, but this was probably in large part due to the active rural sanitation campaign which was being carried out in that province.

TABLE II (xlix).

	1930.		1931.		1932.	
	Cases.	Per 10,000 of total.	Cases.	Per 10,000 of total.	Cases.	Per 10,000 of total.
<b>Total</b>	<b>172,948</b>	<b>25.7</b>	<b>193,013</b>	<b>26.7</b>	<b>152,972</b>	<b>20.8</b>
N.-W. F. P.	202	1.4	320	2.0	426	2.4
Punjab	1,382	1.0	1,567	1.1	1,976	1.4
Delhi	108	1.2	94	1.0	103	1.0
U. P.	1,384	1.8	1,276	1.6	1,200	1.5
B. & O.	20,392	28.3	21,481	28.3	19,439	27.0
Bengal	4,934	5.6	6,069	6.4	4,351	4.6
G. P.	336	1.0	541	1.5	97	0.3
Bombay	235	0.4	407	0.7	1,127	2.1
Madras	141,396	102.5	159,045	103.3	122,405	76.3
Coorg	..	..	..	..	..	..
Assam	700	3.3	857	3.6	901	4.0
Burma	1,867	6.7	1,356	4.6	945	3.1
Baluchistan.	12	0.2	9	0.1	2	..



S. W. C. (50 beds). In addition to the Turner Sanatorium, the Bombay municipality continued to maintain 2 outdoor dispensaries for tubercular patients, one at the Sanitary Institute, Princess Street, and the other at Foras Road. 971 pulmonary cases and 141 other types of tuberculosis were treated at those dispensaries; of these 868 or 79% were under 30 years of age; classified according to race, the figures were 452 or 41% Hindus, 425 or 38% Muhammedans, 199 or 18% Christians, 23 Parsees and 15 Jews. The municipal tuberculosis dispensary in Karachi city treated 39,988 cases including 688 new patients. The 2 lady health visitors attached to this dispensary referred 628 cases of suspicious illness for examination, of whom 347 were found to be suffering from tuberculosis. In Hyderabad town (Sind) 1,137 cases were admitted in the K. T. Tuberculosis Dispensary. An anti-tuberculosis sub-committee was formed under the auspices of the Sind branch of the Indian Red Cross Society.

*Madras.*—40,896 cases of tuberculosis of the lungs were treated in hospitals and dispensaries. Madras city alone recorded 8,497 or 28% of the total, Malabar 4,087, Guntur 2,138, Tanjore 2,109, Coimbatore 1,827, Vizagapatam 1,791, Madura 1,740, North Arcot 1,698, East Godavari 1,536 and Trichinopoly 1,468. Cases of other tubercular diseases totalled 18,210 including 3,933 in Madras, 1,636 in North Arcot and 1,337 in Malabar district.

In Madras city, 917 deaths from tuberculosis were recorded; these included 747, giving a rate of 1.1 p.m., from tuberculosis of the lungs, as compared with a quinquennial mean of 2.0. In other towns, deaths from phthisis included 330 in Calicut; 109 in Mangalore; 83 in Cannanore; 77 in Tellicherry; 70 in Palghat; 61 in Bezwada; 49 in Vizagapatam; and 40 in Cochin.

Institutions for the treatment of tubercular patients included (i) the Union Mission Tuberculosis Sanatorium near Madanapalle; (ii) the Government Tuberculosis Institute, Egmore, Madras; (iii) the Government Tuberculosis hospital, Madras; and (iv) the Visrantipuram Tuberculosis Sanatorium, Rajahmundry.

*Assam.*—Gauhati town recorded 24 deaths from phthisis, Tezpur 19 and Shillong 13. 1,413 cases of tuberculosis of the lungs were treated in hospitals and dispensaries; other tubercular diseases totalled 231. In this connection the I. G. C. H. remarks:—

“A hospital on the sanatorium principle is badly required in Assam for dealing adequately with patients suffering from tuberculosis. At present our hospital accommodation is insufficient to cope with these cases and the climatic conditions in the plains cannot be said to be ideal.”

*Burma.*—In urban areas 2,104 deaths, giving a rate of 1.5 p.m., were ascribed to pulmonary tuberculosis. Rangoon town reported 792 deaths, Mandalay 274, Moulmein 126 and Bassein 71. In Kyaiklat, the disease was reported to be confined to Burmans and Chinese. The main causative factors were said to be insanitary and overcrowded housing conditions, climatic humidity and opium addiction, the last particularly among the Chinese.

*Other Areas.*—Institutions for the treatment of tubercular cases include (i) the Rao Sanatorium, Indore (C. I.); (ii) the Mary Wilson Sanatorium, Tilaunia (Rajputana); and (iii) the Princess Krishnajammani Sanatorium, Mysore.

proved, in 50 the infection was arrested and 40 were not improved. A sanatorium at Almora provides for 40 cases. The 5 tuberculosis dispensaries at Agra, Allahabad, Cawnpore, Lucknow and Sarnath in Benares treated a total of 7,251 cases.

The Lucknow Anti-tuberculosis League could not proceed with the construction of the tuberculosis hospital for want of funds.

*B. & O.*—A total of 17,812 cases of tuberculosis of the lungs were treated in hospitals and dispensaries. Of these the largest numbers were in the districts of Saran (3,287), Patna (2,924), Purnea (1,331), Santal Parganas (1,234), Darbhanga (1,221) and Gaya (1,015). In addition, 7,700 cases of other tubercular disease were also treated, the districts of Saran (1,565) and Patna (1,416) reporting the largest numbers. 75 new cases were treated at the Itki sanatorium which has accommodation for 50 patients.

*Bengal.*—Phthisis caused 11,801 deaths (0.23 p.m.) as against 12,238 (0.24) in 1931. This total included 3,254 deaths in towns, including 2,280 in Calcutta alone and 8,547 in rural areas. The urban death rate was 0.92 or about 5 times that for the rural areas 0.18. The death rate in Calcutta was 1.9.

Cases of tuberculosis of the lungs treated in hospitals and dispensaries in Calcutta totalled 10,035, of which 4,261 were admitted to the Medical College Hospital and 1,088 to the Campbell Hospital. A total of 11,914 cases were treated in *mufassal* institutions. The Tuberculosis Hospital and Sanatorium, Jadabpur, which has 70 beds, admitted 156 cases.

*C. P.*—A total of 1,631 deaths were recorded as due to tuberculosis of the lungs and 781 to tuberculosis of joints, etc. The former group included 1,036 in rural areas (0.8 p.m.) and 595 in urban areas (0.35). 3,576 cases of tuberculosis of the lungs and 2,535 of other types were treated in hospitals and dispensaries. Nagpur district continued to report the largest number with 1,655 cases; other totals were Raipur 614, Nimar 465, Jubbulpore 440 and Amraoti 390. New admissions into the Nirmalendu tuberculosis sanatorium, Pendra, Bilaspur district, totalled only 29 although 55 beds were available. A ward for tubercular cases, in charge of an honorary specialist, was provided at the Mayo Hospital, Nagpur; plans were being made for a provincial sanatorium. The tubercular jail in Chhindwara did useful work.

*Bombay.*—No less than 21,070 deaths (1.0 p.m.) were registered as due to phthisis, the urban death rate being 1.5 and the rural rate 0.8. As regards rural areas, the death rate continued to be high in the Konkan owing to the proximity of this district to Bombay city and to the fact that it supplies a large part of the labour forces employed there. Owing to the return home of infected persons from Bombay city, high rural death rates also continued to be recorded in the districts of Kolaba (2.9 p.m.), Kaira (1.9), Ratnagiri (1.8) and Thana (1.5).

The Presidency has 6 sanatoria :—(i) Turner Sanatorium, Bhoiwada Hill, Bombay city (32 beds), maintained by the Bombay Municipality (ii) Bhadurjee Sanatorium, Deolali (28 beds); (iii) Hindu Sanatorium, Karla (40 beds); (iv) Bel-Air Sanatorium, Panchgani (90 beds); (v) Hillside Sanatorium, Vengurla (25 beds) and (vi) Wanless Tuberculosis Sanatorium near Miraj



The King Edward Sanatorium, Dharampore, provided accommodation for 90 patients; the Lady Irwin Tuberculosis Sanatorium, Sanawar, had 40 beds and treated 50 cases.

Of a total of 14,970 cases of tuberculosis of the lungs and 13,185 of other tubercular disease treated in medical institutions, 1,856 and 2,293 respectively were recorded in Lahore district; 766 and 1,468 in Amritsar; 830 and 614 in Multan; 682 and 232 in Montgomery; 664 and 657 in Ferozepore; 615 and 565 in Sialkot.

*Delhi.*—Pulmonary tuberculosis, which was responsible for 6.2% of the total deaths, was believed to be much more common than the non-pulmonary type of the disease. Of the 992 recorded deaths from tuberculosis, 977 were of the pulmonary type. In connection with the prevalence of tuberculosis, the A. D. P. H. reports that

"If one considered the large number of deaths due to undiagnosed fevers, which in 1932 numbered 7,305, and those ascribed to respiratory diseases which numbered 4,015, it is very likely that a considerable number of cases might have been found to be due to tuberculosis, had it been possible to get sufficient information prior to the occurrence of death of the patient."

In Table II (xlv) deaths from pulmonary tuberculosis are given for the years 1929-32 by sex and by community. It is to be noted that the deaths among females have been each year more than twice those among males.

TABLE II (xlv).

	1930.			1931.			1932.		
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
All classes . . .	424	817	1,241	420	774	1,194	319	580	899
Hindus . . .	281	555	836	255	463	718	128	237	365
Muhammedans . .	143	255	398	151	293	444	183	333	518
Christians . . .	7	7	7	14	18	32	8	10	18

It is estimated that for every death from tuberculosis there are at least 10 infected cases and the A. D. P. H. stresses the need for an organised effort to combat the prevalence of this disease. The appalling condition of Delhi city, he says, is already having repercussions on the state of public health of New Delhi, Shahdara and the Notified Area and a large number of deaths from pulmonary tuberculosis have been reported from these areas. The improvement of economic conditions, the removal of congestion with greater control over the influx of the rural population, housing extensions and better housing conditions in the city are some of the measures suggested for the eradication of the evil. But others are no less important; the establishment of clinics and dispensaries, the provision of a sanatorium and a tuberculosis hospital are essential in any complete preventive scheme.

*U. P.*—A total of 5,191 deaths due to phthisis were recorded, giving a rate of 0.1 p.m. Of these 4,629 occurred in towns with a population of 10,000 and over and 562 in rural circles and other towns with a population of less than 10,000.

19,214 cases of tuberculosis of lungs and 16,640 of other tubercular diseases were treated in hospitals and dispensaries. The King Edward Sanatorium at Bhowali with 110 beds treated 180 new cases; of these, 3 died, 71 im-

Table II (xlv) gives the numbers of tuberculosis cases treated in medical institutions. These are, however, only a fraction of the numbers infected, for, except among the more enlightened sections of the people and among the very poor, little advantage is taken of hospital facilities even where these exist. One of the reasons for this is to be found in the tendency to conceal the actual cause of illness in tubercular members of the family and to seek for medical aid at the hands of unqualified practitioners. Only in the last stages of the disease, it may be said, is resort made to those institutions where skilled help is available.

TABLE II (xlv).

	1932.		1931.		1930.	
	Pulmonary.	Other types.	Pulmonary.	Other types.	Pulmonary.	Other types.
<b>Total</b>	<b>133,715</b>	<b>85,296</b>	<b>148,920</b>	<b>83,194</b>	<b>137,593</b>	<b>79,470</b>
N.-W. F. P.	3,669	3,443	3,837	3,000	3,110	3,728
Punjab	14,970	13,185	14,787	15,026	14,501	14,343
Delhi	3,455	3,368	2,939	3,829	1,909	2,145
U. P.	19,214	16,640	20,055	16,602	18,106	16,259
B. & O.	17,812	7,700	18,606	7,614	18,556	7,198
Bengal	21,949	7,324	20,411	6,133	18,728	5,919
C. P.	3,576	2,525	2,998	1,961	3,210	1,991
Bombay	933	10,426	10,720	9,877	5,873	10,211
Madras	40,896	18,210	40,743	16,473	36,290	15,050
Coorg	75	39	81	59	78	43
Assam	1,413	231	1,479	260	1,337	276
Burma	5,181	1,772	5,451	1,851	5,109	1,782
Baluchistan	562	433	813	509	786	525

## (b) Provincial.

*N.-W. F. P.*—A total of 3,669 cases of tuberculosis of lungs and 3,443 cases of other tubercular disease were treated in hospitals and dispensaries; of these 2,398 and 1,934 respectively were recorded in Peshawar district alone. In regard to this disease, the I. G. C. H. remarks:—

"Tuberculosis cases are not encouraged to come to our hospitals, as they are usually incurable and owing to the contagious nature of the disease are undesirable. These figures therefore have no value in relation to the incidence of the disease which is increasing steadily throughout the province."

The scheme for the establishment of a sanatorium and a hospital for tubercular cases at Haripur in Hazara district was still under consideration; difficulties have arisen in connection with a good water supply.

*Punjab.*—A survey of Lahore was begun in order to ascertain the prevalence of tubercular infections in that town. The scheme comprised detailed investigation of the incidence in a selected area, cases being classified according to type among the different classes of the population; general preventive work embracing all factors affecting the individual and his environment; and propaganda work aided by cinematograph films, lantern slides and posters. A tuberculosis dispensary was also opened.

These figures speak for themselves and emphasise the necessity for action. The problems they reveal certainly merit greater attention than has hitherto been given to them in this country.

Sir George Newman in his health report on England and Wales for 1930 stated that

"Until the decennium 1871-1881, mortality from pulmonary tuberculosis was definitely higher among females aged 20 to 25 than amongst males of the same ages; but the rate of decline was higher among females. The more rapid fall among females continued until the beginning of the present century when the mortality among young women was considerably below that of young men. From that time, however, the rate of fall in the mortality of young women became less marked and finally ceased. One has only to visit a tuberculosis institution for women to be impressed over and over again with the tragic seriousness of the present position in regard to the young adult women group and to a lesser extent, but still serious extent, the young male group."

If these words can be used in regard to the situation in England how much more could be said of the tuberculosis problem which to-day exists in India?

As regards institutions for the treatment of tuberculosis cases, India compares very unfavourably with countries of the west at least. Large sums have been spent on sanatoria and tuberculosis dispensaries during the last 30 years in Britain. The tuberculosis rate in Britain has fallen from 2.1 p.m. in 1871-1880 to 1.73 p.m. in 1881-1890, 1.39 p.m. in 1891-1900, 1.16 p.m. in 1901-10 and 1.08 p.m. in 1911-20, and has further fallen to 0.79 p.m. in 1929, 0.74 in 1930, 0.74 in 1931 and 0.69 in 1932. In France, with a population of only about 42 millions the number of tuberculosis dispensaries at the end of 1932 was 777. In 1930 in Hungary, with a population of only 9 millions, there existed 12 hospitals and sanatoria with a total of 2,900 beds and, in addition, 23 sections and pavilions reserved for the tuberculous in general hospitals had 2,094 beds. In Hungary, the tubercular death rate has decreased since 1918 from 354 per 100,000 to 198 in 1930. So far as is known, we have at the present moment in India with a population of 353 millions only about 20 sanatoria and these too with very limited accommodation. A list of these institutions will be found in Appendix II.

Comparisons are odious and distinctions invidious but the facts and figures in these brief paragraphs must give food for thought to those who have the welfare of India at heart. The only organisation solely concerned with anti-tuberculosis work in India is the King George's Thanksgiving (anti-Tuberculosis) Fund. This organisation is ill-equipped financially and is mainly concerned with propaganda work. It may as yet be said to have only engaged in preliminary skirmishes with its subtle enemy and it is difficult to see how it can do more until ample funds are provided in every province. But it must be realised that the way to victory does not lie, except in small part, in the provision of clinics, hospitals and sanatoria. Money spent on such institutions will be money largely wasted unless the social factors involved are studied and then attacked with vigour. In the practice of more hygienic methods of living, in the provision of ample and nutritious food supplies and generally in a wider appreciation of the dangers inherent in harmful social practices will be found the way to a gradual decrease of this scourge of civilisation and generally to a healthier and happier people.

The value of the recorded figures is greatly vitiated by the fact that correct diagnosis of the cause of death is rarely obtained and numerous deaths from tuberculosis are without doubt registered both in towns and in villages as due to fevers or respiratory disease. Indeed, it may safely be assumed that the majority of the deaths from tuberculosis are registered under one or other of these groups. There exists also the general tendency to conceal the cause of death in tubercular cases for fear of social disabilities or of quarantine and other disinfection measures. Although mortality figures differentiated according to sex are not generally available, the fact that women are more severely infected than men is evident from the higher female death rates from respiratory diseases given in Table II (xxxix) on page 82. Moreover, other figures corroborate this conclusion. For instance, in Calcutta city in 1931, the tuberculosis death rate among females was 3·8 p.m. whilst that among males was 1·8; in Bombay city the corresponding rates were 1·6 and 0·96; in Lahore town they were 2·6 and 0·8; and in Cawnpore 6·3 and 2·0. The male and female death rates from tuberculosis in Rangoon, which are given in Table II (xliv) for the period 1927 to 1931, tell the same tale.

TABLE II (xliv).

	Male.		Female.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.
1927 . . . . .	662	2·77	302	2·83
1928 . . . . .	543	2·27	253	2·37
1929 . . . . .	576	2·41	276	2·58
1930 . . . . .	519	2·17	242	2·27
1931 . . . . .	538	1·98	239	1·85

This cumulative evidence clearly demonstrates the higher incidence among women of infection with the tubercle bacillus and the causes for that higher figure are not far to seek. Early marriage, the strain of a rapid succession of pregnancies and periods of lactation and the *purdah* system, with the inherent deprivation of fresh air and exercise which that social system involves, are all factors bound to produce among the younger women of this country a great lowering of resistance to disease which leaves them readily susceptible to acute infections such as tuberculosis. It is not surprising to find that the female mortality rates are much higher than the corresponding male rates in the age groups between 15 and 40 years. Here again recorded figures leave no shadow of doubt. In Bombay city, for example, out of a total of 1,232 deaths from tuberculosis, 761, including 381 males and 380 females, occurred in the age groups 20—40 years.

During 1931 in Calcutta, three female deaths for every male death were recorded in the age group 10—15 years; two female deaths to one male in the group 15—20 years; and 3 females to every male in the group 20—30 years. The death rates *per mille* were:—

	Male.	Female
10—15 yrs.	0·4	1·2
15—20 "	1·3	3·0
20—30 "	2·5	7·4
30—40 "	2·3	6·7

Table II (xliii) gives for the years 1930-32 the recorded deaths from tuberculosis of the lungs; the death rates *per mille*; and the percentages which these deaths bear to the total recorded deaths from respiratory diseases for the rural and urban areas in those provinces which furnish figures.

TABLE II (xliii).

	1930.			1931.			1932.		
	Deaths.	Rate p.m.	% of deaths from R. D.	Deaths.	Rate p.m.	% of deaths from R. D.	Deaths.	Rate p.m.	% of deaths from R. D.
Delhi—									
Rural . . . . .	55	1.7	4.1	72	0.4	6.2	73	0.4	7.4
Urban . . . . .	780	2.6	24.4	705	1.6	22.7	515	1.2	17.4
Total . . . . .	835	1.7	18.4	777	1.2	18.0	515	0.9	14.8
U. P.—									
Rural . . . . .	568	1.6	5.5	652	1.3	6.7	4,629	1.2	6.5
Urban . . . . .	5,021	1.6	20.6	5,019	1.3	18.6	5,191	1.2	18.5
Total . . . . .	5,589	0.1	16.1	5,672	0.1	15.5	5,191	0.1	15.4
Bengal—									
Rural . . . . .	7,961	0.2	19.8	8,512	0.2	18.5	8,547	0.2	18.5
Urban . . . . .	3,615	1.2	22.8	3,726	1.1	22.7	3,254	0.9	20.3
Total . . . . .	11,576	0.2	20.6	12,238	0.2	19.6	11,801	0.2	19.0
C. P.—									
Rural . . . . .				551	1.5		1,036	0.1	4.1
Urban . . . . .				299	0.2	4.4	595	0.3	11.6
Total . . . . .				850	0.1	2.0	1,631	0.1	5.4
Bombay—									
Rural . . . . .	15,801	1.0	22.8	15,999	0.9	24.0	14,650	0.8	
Urban . . . . .	6,482	1.7	21.2	6,673	1.6	21.2	6,420	1.5	21.0
Total . . . . .	22,283	1.2	22.4	22,672	1.0	23.1	21,070	1.0	22.5
Coorg—									
Rural . . . . .	3		4.5	9	0.1	19.0			
Urban . . . . .	21	2.4	10.5	8	0.8	4.0	20	2.0	10.3
Total . . . . .	24	0.2	8.6	17	0.1	6.8	20	0.1	7.6
Assam (13 larger towns).	43			78	..		73		17.8
Burma—									
Urban . . . . .	1,004	1.5	24.0	2,015	1.4	24.1	2,104	1.5	25.2

R. D. = respiratory diseases.

It is to be noted that, faulty as registration is, high death rates have been recorded in the urban areas of Burma, Bombay, the U. P. and Delhi. As usual, too, the urban rates are in all cases considerably higher than those of rural areas. Whilst bad housing conditions, congestion and overcrowding, especially in the large industrial centres, are mainly responsible for widespread infection in the large towns, the unhygienic habits and customs of the people at large are no less important causes of the general spread of this disease. In the larger cities and towns like Bombay and Calcutta many families are compelled to live in single-room tenements and in consequence conditions for the spread of infection are ideal.

The report of the Royal Commission on Labour contains pertinent remarks in this connection. It says:—

“Generally speaking, the cotton mill workers have little of the stamina required for sustained industrial life and are easily susceptible to malaria and other diseases. Even the more highly paid weavers show a physique little different from that presented by the general labour force of this industry. The health of the women workers is of an even lower grade. Mill work added to the cares of family life in a wretched environment lays them open to infection, and tuberculosis is common.”

*Burma.*—3,954 deaths were recorded in urban areas, the death rate being 2·8 p.m. Of the total, Rangoon city alone reported 1,663 deaths, whilst Mandalay had 456, Akyab 113, Pynmana 111 and Maymyo 107.

Table II (xli) gives death rates *per mille* for some of the larger towns :—

TABLE II (xli).

	1932.	1931.		1932.	1931.
<i>Delhi Province.</i>			Hyderabad .	4·0	5·8
Delhi city . . . .	3·1	1·6	Poona . . . .	5·4	5·1
<i>United Provinces.</i>			Ahmednagar .	2·9	4·5
Lucknow . . . . .	8·6	9·7	Karachi . . . .	6·3	4·4
Agra . . . . .	8·4	8·9	Nasik . . . . .	4·1	4·2
Cawnpore . . . . .	10·0	8·7	Ahmedabad . .	4·0	3·6
Aligarh . . . . .	3·2	3·5			
<i>Bengal Presidency.</i>			<i>Coorg.</i>		
Howrah . . . . .	3·9	3·9	Mercara . . . .	11·7	13·0
Calcutta . . . . .	1·8	3·0			
<i>Bombay Presidency.</i>			<i>Burma</i>		
Bombay . . . . .	5·6	6·2	Rangoon . . . .	4·1	3·5
			Mandalay . . . .	3·1	3·7
			Meiktila . . . .	6·1	5·9

### Tuberculosis.

#### (a) General.

25. In previous reports various comments have been made as to the prevalence of tuberculosis in India, but no accurate estimate of its incidence is possible. Assuming that 2% of the total deaths are due to tubercular disease then nearly 150,000 persons die annually from this infection. But some experts hold that 10% is nearer the truth, and on that basis, tuberculosis deaths would number 650,000. The latter is almost certainly an exaggerated figure but it is probable that the actual number of deaths lies somewhere between these two extremes and even taking the lesser figure, the situation is serious enough. Table II (xlii) gives figures of recorded deaths from tuberculosis of the lung and their percentages to total deaths for 7 provinces where this disease is notifiable, but these figures must not be taken as giving any true picture of actual conditions.

TABLE II (xlii).

	Total deaths.	Deaths from tubercle of lung.	Percentage of total deaths.	Cases of tuberculosis estimated at 10 for each death.
Delhi . . . . .	15,737	593	3·8	5,930
U. P. . . . .	1,076,225	5,191	0·5	51,910
Bengal . . . . .	1,022,219	11,801	1·1	118,010
C. P. . . . .	416,977	1,631	0·4	16,310
Bombay . . . . .	502,474	21,070	4·2	210,700
Coorg . . . . .	3,817	20	0·5	200
Burma (towns)	40,644	2,104	5·2	21,040
<b>Total</b>	<b>3,078,093</b>	<b>42,410</b>	<b>1·4</b>	<b>424,100</b>

Some high urban death rates are given in Table II (xl).

TABLE II (xl).

	Death rate p.m.			Death rate p.m.				
	1932.	1931.		1932.	1931.			
<i>N.-W. F. Province.</i>								
Deshawar . . . . .	5.6	6.5	Saugor . . . . .	9.6	14.1			
<i>Punjab.</i>								
Simla . . . . .	9.3	12.5	Drug . . . . .	2.2	7.8			
Kangra . . . . .	11.6	10.8	Jubbulpore . . . . .	6.0	7.3			
Multan . . . . .	10.0	9.9	<i>Bombay Presidency.</i>					
Ferozepore . . . . .	7.4	9.7	Bombay . . . . .	8.3	9.1			
Amritsar . . . . .	7.1	8.4	Ahmedabad . . . . .	17.4	17.7			
Jullundur . . . . .	6.8	6.5	Surat . . . . .	12.7	13.9			
Sialkot . . . . .	5.7	6.3	Poona . . . . .	10.0	10.0			
<i>Delhi.</i>								
Delhi city . . . . .	8.1	8.9	Nasik . . . . .	9.9	9.9			
<i>United Provinces.</i>						Karachi . . . . .	10.2	9.4
Cawnpore . . . . .	17.3	16.6	Ahmednagar . . . . .	4.3	8.7			
Lucknow . . . . .	12.6	14.0	Hyderabad . . . . .	6.9	8.2			
Agra . . . . .	14.5	13.5	<i>Madras Presidency.</i>					
Benares . . . . .	9.6	11.6	Madras . . . . .	10.1	10.5			
Bareilly . . . . .	7.6	9.2	Kodaikanal . . . . .	8.1	11.0			
Allahabad . . . . .	6.6	8.0	Madura . . . . .	8.7	9.3			
Gorakhpur . . . . .	..	6.9	Ootacamund . . . . .	6.1	7.7			
<i>Bihar and Orissa.</i>						Bellary . . . . .	8.1	7.0
Puri . . . . .	1.7	2.5	<i>Coorg.</i>					
Dinajpur . . . . .	1.1	1.2	Mercara . . . . .	21.5	24.2			
Muzaffarpur . . . . .	0.8	1.0	<i>Assam.</i>					
Cuttack . . . . .	0.4	1.0	Gauhati . . . . .	3.1	2.6			
<i>Bengal Presidency.</i>						Jorhat . . . . .	1.1	2.0
Calcutta . . . . .	7.9	8.2	Sylhet . . . . .	0.7	2.0			
Howrah . . . . .	8.0	9.1	<i>Burma.</i>					
Dacca . . . . .	7.0	6.8	Rangoon . . . . .	7.5	7.3			
<i>Central Provinces.</i>						Mandalay . . . . .	7.2	8.6
Saugor . . . . .	9.6	14.1	Meiktila . . . . .	7.6	7.7			
Drug . . . . .	2.2	7.8	Pegu . . . . .	5.5	6.1			
Jubbulpore . . . . .	6.0	7.3						
<i>Bombay Presidency.</i>								
Bombay . . . . .	8.3	9.1						
Ahmedabad . . . . .	17.4	17.7						
Surat . . . . .	12.7	13.9						
Poona . . . . .	10.0	10.0						
Nasik . . . . .	9.9	9.9						
Karachi . . . . .	10.2	9.4						
Ahmednagar . . . . .	4.3	8.7						
Hyderabad . . . . .	6.9	8.2						
<i>Madras Presidency.</i>								
Madras . . . . .	10.1	10.5						
Kodaikanal . . . . .	8.1	11.0						
Madura . . . . .	8.7	9.3						
Ootacamund . . . . .	6.1	7.7						
Bellary . . . . .	8.1	7.0						
<i>Coorg.</i>								
Mercara . . . . .	21.5	24.2						

### Pneumonia.

24. *U. P.*—9,927 deaths with a rate of 0.2 p.m. were registered; 9,311 or 2.5 p.m. were recorded in towns and 616 or 0.01 p.m., in rural areas.

*Bengal.*—28,158 deaths equivalent to a rate of 0.6 p.m. were recorded. Of these 22,613 deaths or 0.5 p.m. occurred in rural areas and 5,545 or 1.6 p.m. in urban areas.

*Bombay.*—Deaths totalled 21,445 giving a death rate of 1.0 p.m. The highest urban rates were recorded in Surat 7 p.m., Karachi 6, Umarskote 6, Bombay 5.6, Poona 5, Bulsar 5, Tando Adam 5, Nasik 4, Nadiad 4, Dakore 4, Hyderabad 4, Ahmedabad 4 and Mirpur Khas 4. Of the rural districts, Surat 2, Thar and Parkar 2, Karachi and Hyderabad 1.5 recorded high rates.

*Assam.*—185 deaths occurred in 13 of the larger towns for which figures are available, Shillong reporting 45, Gauhati 38, Dibrugarh 17 and Barpeta 17.

*B. & O.*—Recorded death rates were highest in the Orissa division, the districts of Sambalpur 1·2 p.m., Puri 0·9, Cuttack 0·5 and Patna 0·5 being chiefly responsible.

*Bengal.*—The mortality was highest in December and lowest in June. Calcutta recorded the highest death rate in the whole province. Other high figures were in the districts of Jalpaiguri (4 p.m.), Howrah, Darjeeling and Hooghly 3 each. The districts of Malda and Bakarganj each recorded the low rate of 0·3 p.m.

*C. P.*—The mortality was highest in December and lowest in July. Jubbulpore district 9·0 p.m. again recorded the highest mortality; other high rates were Saugor 4·6, Nimar 3·9 and Buldana 3·0; whilst the districts of Balaghat 0·1 and Bhandara 0·3 registered the lowest rates.

*Bombay.*—Of the total deaths, 9,642 were registered in Bombay city; 31,824 in the Northern Registration District; 26,795 in the Central; 17,114 in the Southern; and 8,149 in Sind. The highest rural rates were registered in the districts of Kaira 10 p.m., Surat 8 and Broach 6·6 in the Northern Registration District; the Sind districts as usual recorded the lowest rates: Larkana 0·2, Sukkur 0·4 and Upper Sind Frontier 0·6. High urban rates were recorded in Viramgaon 18, Ahmedabad 17, Umreth 14, Surat 13, Dakore 12·5, Karachi 10, Poona 10, Nasik 10, Jambusar 8, Nandurbar 8, Nadiad 8, Kaira 7, Sholapur 7, Rander 7 and Hyderabad 7.

*Madras.*—The mortality was highest in December and lowest in April. As in previous years, the Nilgiris district recorded the highest rate 3·8, other district rates being Kistna 3, Madura 3 and Bellary 3. The general municipal death rate was 5 p.m.; high rates were recorded in Madras 10, Cocanada 9, Madura 9, Bellary 8 and Kodaikanal 8; Tadpatri 0·7, Peddapuram 1·3 and Villipuram 1·3 recorded the lowest rates.

*Assam.*—Mortality was highest in March and lowest in April. District death rates varied between 1·7 p.m. in Lakhimpur, 1·4 in Cachar, 1·0 in Sib-sagar and 0·1 in Goalpara; the highest urban rate of 4·5 was recorded in Haflong and the lowest 0·5 in Maulvi Bazar.

*Burma.*—Rangoon town recorded the highest death rate 7·5 p.m., the female rate being 8·4 and the male rate 7·0. Districts reporting high death rates included Lower Chindwin 3·3 p.m., Mandalay 3·3, Amherst 1·4 and Yamethin 1·0. In regard to the high rate in Lower Chindwin district, the D. H. O. remarks:—

“I am not prepared to believe that the incidence of respiratory diseases has so much increased as to account for over 1,117 deaths in 1931 and 1,154 in 1932 compared with 80 deaths in 1930. The true explanation seems to be that while previously all deaths amongst infants and children were returned as “*Thungena*” (child disease), a vast proportion of these is now returned as due to respiratory diseases; I therefore maintain that the increase is due to improvement in the registration of the causes of death amongst infants and children.”

The contrast between urban and rural figures is very striking, this being probably due to more accurate registration in the former; moreover urban conditions generally favour the spread of these diseases.



Table II (xxxix) gives the recorded deaths and rates p.m. by sex and rural and urban areas in British India and in the provinces.

TABLE II (xxxix).

	Male.		Female.		Rural.		Urban.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
British India .	228,035	1.6	177,375	1.4	276,488	1.1	129,441	4.9
N.-W. F. P. .	1,792	1.4	1,302	1.2	1,806	0.9	1,228	3.9
Punjab . . .	33,244	2.5	27,007	2.5	46,187	2.3	14,064	4.5
Delhi . . .	1,907	5.1	1,594	5.8	1,057	5.4	2,958	6.7
U. P. . . .	17,892	0.7	15,838	0.7	8,659	0.2	25,071	6.7
B. & O. . . .	3,208	0.2	2,374	0.2	4,915	0.1	687	0.5
Bengal . . .	39,140	1.5	23,109	1.0	46,248	1.0	16,001	4.5
C. P. . . .	17,949	2.3	12,462	1.6	25,290	1.8	5,121	3.0
Bombay . . .	51,046	4.4	42,478	4.0	62,943	3.6	30,581	7.3
Madras . . .	50,770	2.2	43,542	1.9	70,791	1.8	23,521	3.8
Coorg . . .	200	2.2	64	0.7	70	0.5	194	19.7
Assam . . .	3,222	0.8	2,136	0.6	4,949	0.6	409	2.1
Burma . . .	6,982	1.1	4,848	0.8	3,486	0.3	8,344	5.9
Ajmer-Merwara .	683	2.3	621	2.3	22	..	1,282	7.2

*N.-W. F. P.*—The urban rate, though lower than that of 1931, was still more than 4 times the rural rate. Town rates varied between 6.4 p.m. in Nawanshahr and 0.3 p.m. in Lakki.

*Punjab.*—The highest recorded district death rates were Ambala 14.0 p.m., Simla 8 p.m., Kangra 7, Sialkot 4, Lahore 3.5, Amritsar 3, Gurdaspur 3, Jhang 3, Rawalpindi 3, Hoshiarpur 2.5 and Jhelum 2.

*U. P.*—The mortality peak occurred in December and the minimum in July. The death rate ruled highest in the districts of Hamirpur 6.0 p.m., Lucknow 4.3, Cawnpore 3.3 and Agra 3.0, whilst the districts of Mainpuri, Basti and Kheri returned the lowest rates. The recorded urban death rate was nearly 33 times higher than the rural rate. Among towns, 5 did not record any deaths; in 18 the deaths did not exceed 10; whilst Cawnpore had the high rate of 17.3 p.m.; Kashipur 16.6; Rath 14.9; and Agra 14.5. Of the rural areas, Hamirpur district 5.9 p.m. again headed the list, followed by Dehra Dun 1.2; Jalaon 0.9 and Garhwal 0.8, whilst low rates varying from 0.01 to 0.02 p.m. were recorded in Sultanpur, Basti, Hardoi and Bahraich.

*C. P.*—A total of 1,706 cases was treated in hospitals and dispensaries, of which 48 died. The largest number of cases were treated in Nagpur 189, Jubbulpore 175, Amraoti 159 and Wardha 144.

*Bombay.*—Of the total, 4,157 with a rate of 0·2 p.m. were recorded in rural areas and 1,290 with a rate of 0·3 p.m. in urban areas. In rural areas, the largest numbers of deaths were 1,019 in West Khandesh, 780 in Kolaba, 401 in Dharwar, 357 in Kanara and 314 in Belgaum; of the towns, the largest numbers were recorded in Shikarpur 180, Hyderabad 135, Sholapur 82, Hubli 73, Poona 62, Karachi 55, Sukkur 44, Belgaum 34, Ahmednagar 34, Surat 33 and Dharwar 29. In Karachi city, a mild epidemic prevailed after the rains, whilst in Hyderabad the disease was endemic during the summer months.

*Assam.*—An outbreak of typhoid fever occurred in Gauhati town.

*Burma.*—Recorded deaths in towns totalled 395, the death rate being 0·3 p.m. Rangoon recorded 85 deaths, Mandalay 89, Moulmein 69, Allanmyo 36, Bassein 13, Maymyo 13, Pyinmana 10 and Sagaing, Tharrawaddy and Moulmeingyun 6 each. In Tharrawaddy where 22 cases were recorded, the outbreak continued from May to October. In Maymyo, the source of infection could not be traced but infected surface wells and infected fruit were suspected. In Mandalay, recorded cases increased from 143 to 194 probably owing to better registration.

### Respiratory Diseases.

23. Table II (xxxviii) gives the recorded deaths and rates p.m. for British India and the provinces.

TABLE II (xxxviii).

	Deaths.		Rates <i>per mille</i> .		
	1932.	1931.	1932.	1931.	Mean. 1927-31.
<b>British India</b>	405,924	420,294	1·5	1·6	1·6
N.-W. F. P.	3,094	2,230	1·3	1·0	0·9
Punjab	60,251	55,317	2·5	2·4	2·3
Delhi	4,015	4,348	6·2	6·8	8·0
U. P.	33,730	36,612	0·7	0·8	0·7
B. & O.	5,582	7,013	0·1	0·2	0·2
Bengal	62,249	62,351	1·2	1·2	1·0
C. P.	30,411	42,537	2·0	2·7	2·7
Bombay	93,524	97,969	4·2	4·5	4·9
Madras	94,312	93,222	2·0	2·1	2·1
Coorg	264	251	1·6	1·5	1·8
Assam	5,358	5,895	0·7	0·7	0·7
Burma	11,830	12,016	1·0	1·0	1·0
Ajmer-Merwara	1,304	533	2·3	0·9	0·6

TABLE II (xxxvii).

	Deaths.	Rate p.m.		Deaths	Rate p.m.
<i>Delhi Province.</i>					
Delhi city . . .	484	1.4	Dacca .	59	0.4
			Serampur	10	0.3
			Bhatpara	21	0.2
<i>United Provinces.</i>			<i>Bombay.</i>		
Balrampur . . .	378	19.2	Shikarpur	180	2.9
Kashipur . . .	45	4.0	Bagalkot	17	1.1
Reotipur . . .	36	3.4	Kalyan .	15	0.6
Chandpur . . .	32	2.3	Dharwar	29	0.7
Jhansi . . .	78	1.2	Ahmednagar	34	0.8
Hathras . . .	91	2.3	Sukkur .	44	0.6
	22	0.9			
Mau .	74	5.8	Poona .	62	0.4
Haldwani .	32	2.8	Bijapur .	16	0.4
			Hyderabad	135	1.4
Agra . . .	164	0.8	Hubli .	73	0.8
Nehtaur . . .	15	1.1	Belgaum	34	0.8
Budaun . . .	31	0.7	Surat .	33	0.3
Farrukhabad .	59	1.0	Bombay .	177	0.1
Shahjahanpur	51	0.6	Sholapur	82	0.6
Allahabad .	27	0.1	Karachi .	55	0.2
Benares .	25	0.1			
Aligarh .	23	0.3	<i>Assam.</i>		
Lucknow .	23	0.1	Shillong .	4	..
			Dhubri .	3	..
<i>Bengal.</i>					
Berhampur .	19	0.7			
Howrah . . .	227	1.0	<i>Burma.</i>		
South Suburban	50	1.3	Moulmein	69	1.0
			Mandalay	89	0.6
Burdwan . . .	29	0.7			
Calcutta . . .	864	0.7	Bassein .	13	0.3
Rangpur . . .	11	0.5	Rangoon .	85	0.2

Additional information for different provinces is given below :—

*U. P.*—Rural districts in Gorakhpur division registered 1,610 deaths, those in Jhansi division 1,249 and those in Benares division 1,071. The highest death rates were recorded in the rural districts of Jhansi 1.4 p.m. and Jalaun 1.1 p.m. Of the towns, Balrampur in Gonda district registered the very high rate of 19.2 p.m.; other high figures were Mau (Jhansi district) 5.8 p.m.; Kashipur (Nainital) 4.0; Reotipur (Ghazipur) 3.4; Haldwani (Nainital) 2.8; Hathras (Aligarh) 2.3; Chandpur (Bijnor) 2.3; Debai (Bulandshahr) 1.9; Nehtaur (Bijnor) 1.4; and Gahmar (Ghazipur) 1.4.

*Bengal.*—Compared with 1931, the death rate declined by 20% in the whole province and by 25% in rural areas; it rose by 14% in Calcutta and by 10% in all other urban areas. Of the rural total, 1,868 deaths occurred in Rangpur district alone; 714 in Hooghly; 518 in Dinajpur and 479 in Khulna. Among towns, Calcutta (864 deaths), Howrah (227) and Dacca (59) reported the largest numbers.

TABLE II (xxxv).

	Dysentery and diarrhoea deaths, 1932.	Death rate p.m.		Deaths from diarrhoea.	Death rate p.m.	Deaths from dysentery.	Death rate p.m.
		1932.	1931.				
<b>British India</b> . . . . .	<b>222,804</b>	<b>0·8</b>	<b>1·0</b>	..	..	..	..
N.-W. F. P. . . . .	529	0·2	0·1	..	..	..	..
Punjab . . . . .	13,287	0·6	0·6	1,315†	..	679†	..
Delhi . . . . .	499	0·8	0·8	66	0·1	433	0·7
U. P. . . . .	12,836	0·3	0·3	7,177	0·2	5,659	0·1
B. & O. . . . .	15,727	0·4	0·6	..	..	..	..
Bengal . . . . .	39,562	0·8	0·9	18,023	0·4	21,539	0·4
C. P. . . . .	23,493	1·5	2·9	19,752	1·3	3,741	0·2
Bombay . . . . .	22,610	1·0	1·2	18,807	0·9	3,803	0·2
Madras . . . . .	80,410	1·7	1·8	..	..	..	..
Coorg . . . . .	110	0·7	0·7	55	0·3	55	0·3
Assam . . . . .	8,241	1·3	1·2	63*	..	287*	..
Burma . . . . .	5,191	0·4	0·5	922†	0·6	918†	0·6
Ajmer-Merwara . . . . .	309	0·5	0·4	..	..	..	..

\* for 13 larger towns. † for towns only. ‡ for 13 towns in charge of whole time M. O. Hs.

### Enteric Fever.

22. *General*.—This disease is no doubt much more prevalent than the statistical records indicate, as most cases are recorded under “fevers.” It is very probable that in large towns like Delhi severe epidemics are of frequent occurrence and as a result a considerable portion of the child population acquires immunity. It is difficult to envisage any rapid improvement in the diagnosis of this disease in rural areas.

Table II (xxxvi) and Table II (xxxvii) give the recorded incidence of this disease in certain provinces and in a number of the larger towns but the figures are unlikely to be even approximately correct.

TABLE II (xxxvi).

Areas	Deaths.	Rate p.m.	Areas.	Deaths.	Rate p.m.
<i>Delhi.</i>			<i>Bombay.</i>		
Rural . . . . .	..	..	Rural . . . . .	4,157	0·2
Urban . . . . .	484	1·1	Urban . . . . .	1,290	0·3
Total . . . . .	484	1·1	Total . . . . .	5,447	0·2
<i>U. P.</i>			<i>Coorg.</i>		
Rural . . . . .	7,199	0·2	Rural . . . . .	1	..
Urban . . . . .	1,583	0·4	Urban . . . . .	3	0·3
Total . . . . .	8,782	0·2	Total . . . . .	4	..
<i>Bengal.</i>			<i>Assam.</i>		
Rural . . . . .	8,641	0·2	(13 larger towns) . . . . .	48	..
Urban . . . . .	1,535	0·4	<i>Burma.</i>		
Total . . . . .	10,176	0·2	Urban . . . . .	295	0·2



in Sylhet, 1,186 in Lushai Hills, 906 in Kamrup, 759 in Sibsagar, 431 in Khasi and Jaintia Hills, 431 in Goalpara, 349 in Darrang, 326 in Cachar, 276 in Lakhimpur, 108 each in Nowgong and Naga Hills, 65 in Sadiya Frontier Tract, 49 in Garo Hills and 50 in Manipur State.

*Burma.*—Cinchona febrifuge tablets totalling 3,110,400, or 280,000 more than in 1931, were sold and 119,000 were issued free in 12 districts as against 220,200 in 1931 in 14 districts. The largest free supplies were made in the districts of Chin Hills 40,000, Mergui 20,200, Pakokku 15,000, Tharrawaddy 10,000, Meiktila 10,000 and Myitkyina 9,000. The average amount consumed per head of population increased from 0.86 grains in 1931 to 0.88 grains; the highest amount was 13.6 grains per head in Bhamo.

### Dysentery and Diarrhoea.

21. The incidence of these diseases was less than in 1931 and except in N.-W. F. P. and Ajmer-Merwara, lower mortality rates were recorded throughout British India, the general rate being 0.8 p.m. Of the total 115,979 deaths were male and 106,825 female; and 176,195 deaths were recorded in rural and 46,609 in urban areas. Table II (xxxiv) gives the numbers of deaths from these diseases for each quarter during the quinquennium, 1928-32. As usual, the third quarter recorded the highest number of deaths.

TABLE II (xxxiv).

	1928.	1929.	1930.	1931.	1932.
<b>Total</b>	<b>221,338</b>	<b>235,470</b>	<b>237,892</b>	<b>268,331</b>	<b>222,804</b>
1st Quarter	44,945	48,202	49,237	50,386	50,976
2nd "	50,523	50,974	54,483	54,267	47,089
3rd "	65,920	68,789	70,143	89,694	64,514
4th "	59,900	67,505	64,029	73,984	60,225

The highest rates were recorded in the provinces of Madras, C. P., Bombay and Assam; and the lowest in N.-W. F. P.

In the U. P., the hill districts of Garhwal (3.9 p.m.), Almora (1.0) and Dehra Dun (1.0) reported the highest rates, whilst the districts of Banda, Basti, Rae Bareilly and Bahraich recorded the low rate of 0.01 p.m. In B. & O. this group was as usual most prevalent in the Orissa division, partly owing to climatic conditions and partly to the bad state of water supplies. The D. P. H. remarks:—

"These diseases resemble cholera in their nature and in their incidence. They belong to the group of intestinal disease, the transmission of which is associated with the infection of the individual by contact or with the contamination of water-supplies by excreta or of food by flies. They tend to become epidemic under the same conditions and by the same means

and Moradabad was discontinued in March, but in order to ascertain its effect on the malarial incidence in places where no such scheme was previously in existence and, in view of the high spleen rates, it was started in 20 villages in the districts of Lucknow, Unao and Hardoi in September. The malarial incidence in each of these villages and other "control" villages was ascertained. Owing to shortness of funds, the course of cinchona and plasmoquine was reduced from 7 days to 3 days, the dosage for adults being 20 grains of cinchona per day and one-sixth grain of plasmoquine twice a day; that for children, women and weak persons was smaller. Cases treated totalled 856 and the relapse rate was 8%.

Cinchona was also distributed through local bodies and voluntary agencies in Pilibhit district; in 42 villages in Shahjahanpur; 24 villages in Partabgarh; 8 villages in Mirzapur; and in 6 villages in Unao.

*B. & O.*—Quinine requirements are obtained from the Presidency jail in Calcutta. 455 lbs. of quinine sulphate, as against 536 lbs. in 1931, were sold through post offices, etc., at 5½ annas per treatment of 20 tablets packed in small glass tubes. The largest quantities were taken by the districts of Cuttack, Purnea, Singhbhum, Balasore and Santal Parganas.

*Bengal.*—9,031 lbs. of quinine were issued as against 7,835 in 1931.

*C. P.*—1,240 lbs. of quinine sulphate, 750 lbs. of cinchona febrifuge and 35 lbs. of quinine hydrochloride were purchased from Madras and distributed. The scheme of free distribution of quinine in hyper-endemic areas in the districts of Betul and Nimar and in the *jagirs* of Chhindwara district was continued. In the malarious tracts of Narsinghpur district, quinine was sold through school masters at the low rate of 2 tablets for 1 pice.

*Bombay.*—The local government sanctioned Rs. 30,000 for the free distribution of quinine, Rs. 30,000 for sale of the drug through post offices and Rs. 9,750 for the cheap sale of quinine treatments. The figures of actual expenditure were Rs. 26,414, Rs. 21,645 and Rs. 9,605 respectively. 439,000 quinine pills of 5 grains each and 1,682,000 of 2 grains each were issued for free distribution in Sind; 113,390 pills of 5 grains and 70,650 of 2 grains in the Southern Registration District; and 57,452 pills of 5 grains and 81,905 of 2 grains in the Central Registration District. In addition, 1,775 pills of 5 grains and 1,934 of 2 grains each were distributed by the railway medical staff in the Southern Registration District.

*Madras.*—The scheme of free distribution of quinine was extended to new areas which surveys had shown to be malarious. The *firka* group of villages was made the unit and in 13 districts the scheme was at work. The decrease in fever mortality already noted in previous years was even more marked during 1932 particularly in the districts of Cuddapah and Kurnool. Whilst in South Kanara the number of malaria deaths was nearly the same as in 1931 and 1930, in Bellary the mortality once more increased owing to the greater prevalence of infection.

*Assam.*—6,531 packets of 10 treatments each were sold through post offices and other agencies as against 7,170 in 1931. The total included 1,484

*Burma.*—Free issues of cinchona febrifuge tablets totalled 126 lbs. in 1931, 68 in 1932 and 192 in 1933. Quinine was neither issued free nor at a reduced price.

*Ajmer-Merwara.*—The statement below gives details of the issues in lbs. :—

	Quinine.		Cinchona febrifuge.	
	Free.	At reduced price.	Free.	At reduced price.
1931	69	11	77	4
1932	76	4	59	4
1933	55	8	45	6

Further details of the distribution of these drugs by provincial public health departments and other associated agencies are given in the following sub-paragraphs :—

*Punjab.*—1,371 lbs. of quinine and 398 lbs. of cinchona febrifuge were distributed in rural areas. 40 lbs. of quinine tablets were distributed free of cost in Mianwali and 7 lbs. in Muzaffargarh.

*U. P.*—The quinine factory was transferred from the Aligarh jail to the Malaria Branch of the P. H. Department in Lucknow. The reorganised factory manufactures quinine and cinchona tablets at cheaper rates; the cost of quinine tablets has fallen from Rs. 30 to Rs. 22 per lb.; that of cinchona tablets from Rs. 12 to Rs. 11 per lb.; and the one anna packets of quinine tablets sold through post offices which previously contained 4 tablets of 3 grains now have 5 tablets of 3 grains each. Issues of quinine totalled 619 lbs.; through post offices 308 lbs.; through the epidemiology branch of the P. H. Department 100 lbs.; and other issues 211 lbs. Issues of cinchona totalled 695 lbs. 134 lbs. of quinine were issued to the district M. O. Hs. of Fatehpur, Hardoi, Unao, Lucknow, Kheri, Gorakhpur, Fyzabad, Basti, Garhwal and Rae Bareilly and to the civil surgeons of Saharanpur, Farrukhabad and Pilibhit and the secretary of the village uplift scheme in Shahjahanpur. The jail department distributed approximately 12½ lbs. of quinine and cinchona to prisoners and staffs. The entire population of the district and central jails, Allahabad, the central jail, Benares, and the district jail, Muttra, were examined for evidences of malaria; in addition, routine anti-larval measures were carried out and those harbouring malarial parasites were given quinine and plasmoquine for 3 days. In the Lucknow central and district jails, as a result of quinine and plasmoquine treatment, malarial cases decreased from 184 cases in 1931 to 80 and the relapse rate was only 15%, a figure considerably lower than that obtained even under prolonged courses of quinine treatment. On the recommendation of the P. H. Department the standard combined quinine and plasmoquine treatment has been introduced in all jails in the province.

In the Tarai and Bhabar government estates, 30 lbs. of quinine and 120 lbs. of cinchona tablets were distributed free; and a scheme of treatment with cinchona and plasmoquine was in force in 19 villages under the supervision of the district M. O. H., the cost being met by the estates.

The scheme of combined treatment with cinchona and plasmoquine in the rural districts of Muttra, Muzaffarnagar, Kheri, Gorakhpur, Bulandshahr



*B. & O.*—In 1931-32, of the 94 lbs. of quinine issued free by the P. H. Department, only 54 lbs. were actually consumed. Free distribution of quinine was discontinued in 1932-33; no secondary alkaloids of cinchona were issued free or at a reduced price.

*Bengal.*—Quantities in lbs. purchased and distributed free during the period 1931-33 by the Public Health Department are given below :—

	Quinine powder.	Quinine tablets.	Quinine treatments.	Cin. feb. Powder.	Cin. feb. Tablets.	Other drugs.
1931 . . .	2,635	3,461	..	1,911	2,216	15
1932 . . .	2,653	1,388	..	2,866	2,101	9
1933 . . .	5,850	3,639	111 boxes	3,123	2,091	58

*C. P.*—The following quantities in lbs. were distributed free or at reduced price :—

	Free.		At reduced price.
	Quinine.	Cin. feb.	
1931 . . . . .	989	673	1,268
1932 . . . . .	1,008	657	1,020
1933 . . . . .	1,083	758	1,661

*Bombay.*—The amounts in lbs. of quinine and cinchona febrifuge distributed during 1930-33 are given below :—

	Free.		At reduced price.
	Quinine.	Cinchona.	
1930 . . . . .	2,337	..	1,970
1931 . . . . .	1,669	..	1,886
1932 . . . . .	1,676	..	1,378
1933 . . . . .	1,434	..	1,164

*Madras.*—The P. H. Department distributed 2,183 lbs. of quinine free of cost as compared with 909 lbs. in 1931-32 and 1,857 lbs. in 1930-31; the quantities issued at a reduced price were 1,290 lbs. in 1930-31; 2,346 in 1931-32 and 1,707 lbs. in 1932-33. No secondary alkaloids of cinchona were issued free or at reduced price.

*Coorg.*—The statement below gives the figures in lbs. of the issues :—

	Free.		At reduced price.
	Quinine.	Cin. feb.	
1931 . . . . .	447	143	33
1932 . . . . .	387	248	23
1933 . . . . .	321	220	18

*Assam.*—The quantities in lbs. distributed are tabulated below :—

	P. H. Department.			Medical Department.			
	Free.		At reduced price.	Free.		At reduced price.	
	Q.	Cin.		Q.	Cin.	Q.	Cin.
1931 . . . . .	22	12	292	2,535	2,321	1,462	..
1932 . . . . .	63	152	293	926	1,050	1,664	..
1933 . . . . .	138	291	367	945	2,584	2,230	10

TABLE II (xxxiii)—*contd.*

*Quantities to the nearest lb. of quinine and secondary alkaloids of cinchona, distributed free or at reduced rates during 1931, 1932 and 1933—contd.*

District.	Quinine.			Secondary alkaloids of cinchona.		
	1931.	1932.	1933.	1931.	1932.	1933.
Bijnor . . .	29	26	31	44	46	69
Bareilly . . .	69	47	39	70	77	69
Benares . . .	71	8	12	15	23	29
Bulandshahr . . .	19	19	16	24	33	29
Banda . . .	25	17	21	..	..	..
Bara Banki . . .	47	36	31	..	..	..
Cawnpore . . .	..	..	..	..	..	..
Dehra Dun . . .	27	28	28	15	11	13
Etah . . .	20	19	12	36	21	23
Etawah . . .	23	26	14	32	20	16
Fyzabad . . .	13	16	19	14	21	14
Fatehpur . . .	21	11	8	16	12	12
Fatehgarh . . .	34	44	27	40	44	45
Gonda . . .	..	..	1	..	..	..
Garhwal . . .	21	16	17	13	10	14
Gorakhpur . . .	60	47	68	76	80	126
Ghazipur . . .	9	7	9	16	17	12
Hardoi . . .	14	18	13	32	18	25
Hamirpur . . .	25	17	18	19	18	15
Jhansi . . .	22	19	17	44	35	36
Jaunpur . . .	20	16	13	26	19	19
Jalaun . . .	..	..	..	..	..	..
Kheri . . .	31	31	29	35	34	30
Lucknow . . .	67	38	40	117	101	120
Mirzapur . . .	23	23	12	46	34	33
Meerut . . .	..	..	32	..	..	..
Mussoorie . . .	7	7	7	4	5	5
Moradabad . . .	29	25	29	51	41	42
Mainpuri . . .	34	20	18	..	40	30
Muzaffarnagar . . .	..	..	..	..	..	..
Muttra . . .	29	17	24	50	43	35
Naini Tal . . .	50	47	68	56	46	58
Partabgarh . . .	8	7	7	20	18	12
Pilibhit . . .	40	33	36	29	37	45
Rae Bareli . . .	23	24	29	66	133	43
Ranikhet . . .	19	6	10	..	6	16
Roorkee . . .	4	2	2	3	6	4
Sitapur . . .	35	28	32	2	13	23
Saharanpur . . .	33	32	53	45	48	56
Shahjahanpur . . .	27	11	14	34	34	38
Sultanpur . . .	10	8	8	24	23	24
Unao . . .	35	23	19	63	40	42

*N.-W. F. P.*—None was issued at reduced price but the quantities in lbs. of free issues are given below :—

	Quinine.	Cinchona Alkaloids.
1931 . . . . .	904	1,060
1932 . . . . .	1,018	1,072
1933 . . . . .	1,102	1,087

*Punjab.*—The following issues in lbs. were made :—

	Free by P. H. Department.		Medical Department. Quinine at reduced price.
	Quinine.	Cin. feb.	
1931 . . . . .	1,458	224	117
1932 . . . . .	1,371	398	101
1933 . . . . .	2,785	849	113

*Delhi.*—62 lbs. of quinine and 8 lbs. of cinchona were distributed free as against 56 lbs. and 6 lbs. in 1931.

*U. P.*—Quantities in lbs. of quinine and cinchona febrifuge distributed free by the P. H. Department during the years 1931-33 are given below. None was issued at reduced price.

	Quinine.	Cin. feb.
1931 . . . . .	382	306
1932 . . . . .	112	134
1933 . . . . .	200	289

The figures supplied by the U. P. Medical Department are given in Table II (xxxiii).

TABLE II (xxxiii).

*Quantities to the nearest lb. of quinine and secondary alkaloids of cinchona, distributed free or at reduced rates during 1931, 1932 and 1933.*

District.	Quinine.			Secondary alkaloids of cinchona.		
	1931.	1932.	1933.	1931.	1932.	1933.
<b>Total</b> . . . . .	<b>1,357</b>	<b>1,059</b>	<b>1,141</b>	<b>1,408</b>	<b>1,511</b>	<b>1,489</b>
Agra . . . . .	81	73	89	99	100	100
Allahabad . . . . .	31	36	30	35	28	26
Aligarh . . . . .	117	29	31	..	70	49
Almora . . . . .	11	11	11	..	..	..
Azamgarh . . . . .	..	..	..	..	..	..
Basti . . . . .	24	29	30	39	34	50
Bahraich . . . . .	40	40	41	42	59	34
Ballia . . . . .	8	6	9	..	..	..
Budan . . . . .	26	16	17	20	13	17

TABLE II (xxxii).

	Quinine sulphate.	Cinchona febrifuge.	Cinchona fibrifuge tablets.	Quinine sulphate tablets.	Quinine hydro- chloride.	Quinine di-hydro- chloride.	Quinine bisulphate and tablets.	Totals.	Cinchona bark.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Total	18,948	8,192	571	417½	476½	1,043	106	10	1,082
Government hospitals	1,896	324	..	140½	31	11	..	..	..
Local Fund Institutions	1,520½	476½	6	20½	..	..	..	..	..
Municipal Institutions	400½	67½	..	..	..	..	..	..	..
Medical Store Depot—									
(a) Madras	1,010	186	..	..	30	774	..	..	382
(b) Bombay	3,000	950	..	..	50	198	..	..	240
Yeravda Prison, Poona	2,540	..	..	..	300	..	..	..	..
Burma	1,400	1,700	..	..	10	60	..	..	..
Central Provinces	1,240	750	..	..	35	..	..	..	..
Coorg	154	125	123	293	..	..	..	..	..
M. & S. M. Railway	108	82	241	..	..	..	..	..	..
Public	..	990	70	..	..	..	..	..	..
Indian States	2,740	2,296	..	13	20½	..	..	..	..
Miscellaneous	161	206	131	1½	..	..	108	10	..

lbs. of cinchona febrifuge at a cost of Rs. 1·820 per lb. Of these totals, 3,981 lbs. and 2,274 lbs. were for the Government of India.

Table II (xxxi) gives details of the manufacture and disposal of the factory products to the nearest lb.

TABLE II (xxxi).

	Balance on 1st April 1932.	Manufac- tured.	Total.	Issued or sold.	Balance on 31st March 1933.
Quinine sulphate powder . . .	41,012	1,207	42,219*	10,596	22,229
"    "    crude . . .	67,803	43,095	110,898	1,658	109,241
Other quinine salts . . .	295	657	952	577	375
Quinidine sulphate tablets . . .	1,200	2,057	3,257	2,508	749
Cinchonine salts . . .	52	..	52	2	50
Cinchonidine salts . . .	62	..	62	12	50
Quinidine . . .	301	..	301	90	211
Cinchona febrifuge powder . . .	..	22,749	22,749†	14,058	3,065
"    "    tablets . . .	657	5,626	6,283	5,326	956
Quinine sulphate tablets (boxes)	35,620	81,068	116,688	93,914	21,910‡

\* 11,633 lbs. converted to other products.

† 5,626 lbs. converted to other products.

‡ Excluding 864 written off or damaged and returned to process.

*Madras Government Cinchona Department.*—A total of 23,153 lbs. of quinine sulphate was produced including quinine sulphate and tablets 21,502 lbs.; quinine hydrochloride 840 lbs. and quinine dihydrochloride 1,442 lbs. The production of cinchona febrifuge and tablets amounted to 10,993 lbs. or 1,909 lbs. more than in 1931-32, whilst totaquina to the amount of 3,520 lbs. was manufactured for the first time.

A total of 521,307 lbs. of cinchona bark was treated; 124,634 lbs. were obtained from government plantations and 396,673 lbs. were purchased locally; only 43,498 lbs. were available for purchase from private planters.

Total sales of quinine salts which amounted to Rs. 4,25,449 during 1932-33 are detailed in Table II (xxxii). Cost of production per lb. was Rs. 12-14-1 of which quinine bark amounted to Rs. 9-15-9 and cost of extraction Rs. 2-14-4, a reduction of 10 annas as compared with the previous year.

Although it has been the general belief that the quantities of quinine consumed in different parts of India were lamentably insufficient to produce any real effect in the prevention and treatment of malaria, few actual figures in this respect have ever been published. Particulars of the quantities of quinine and cinchona febrifuge distributed free or sold at reduced prices have been kindly supplied by provincial D. P. Hs. in response to a questionnaire issued from this office. The amounts issued have been calculated per head of the population in each district and these figures are given as an Appendix to this section of the report (page 365). They reveal a state of affairs which more than confirms the belief that quinine is seldom used in therapeutically adequate amounts and that the quantities consumed can have little or no effect on the malarial infections so widely prevalent in many parts of India.

supplemented by government grants on the condition that the work is carried out on lines approved by the provincial malaria committee. Both the A. D. P. Hs. are trained in malariology and conduct anti-malarial measures independently and in co-operation with the Assam Medical Research Society which receives an annual contribution from Government and employs a research officer and 8 sub-assistant surgeons for malaria work. The malaria research officer conducts a training class in Shillong in which both theoretical and practical training in anti-malarial methods is given to sub-assistant surgeons. The local Government placed a sum of Rs. 26,000 at the disposal of the malaria committee for distribution among local bodies for anti-malarial measures.

Surveys and anti-larval measures were carried out by (a) the A. D. P. Hs. in Sylhet town; in 3 other areas in Sylhet district; and in 3 localities in Goalpara district; (b) by the Assam Medical Research Society, in Haflong, Hailakandi and Maibong in Cachar district; in Gauhati in Kamrup district; in Nowgong and Lumding in Nowgong district; in Sibsagar, Golaghat, Jorhat and Cinnamara in Sibsagar district; in North Lakhimpur, Doom Dooma, Digboi, Jaypur and Namsang in Lakhimpur district; in Tezpur, Mangaldai and 2 other areas in Darrang; in Kohima and Dimapur in the Naga Hills; in Shillong and Nongpoh in the Khasi and Jaintia Hills; and in Pasighat in the Sadiya Frontier Tract. The Indian branch of the Ross Institute also did extensive work in the tea-gardens.

*Burma.*—Organised anti-malarial measures were in progress in Kyaukpnyu, Akyab, Kalaw, Lashio, Taunggyi, Bhamo, Syriam, Moulmein, Shwebo, Namtu, Hsipaw, Shwenyaung and Sahmaw. Some of the recorded results are interesting, e.g., in Kyaukpnyu the spleen rate has fallen from 18% in 1931 to 12%; in Akyab from 17.3% in 1925 to 12.5%; in Lashio from 66.7% in 1926 to 17.3%; and in Sahmaw from 73% in 1929 to 23%.

### Quinine.

20. *Botanical Survey of India.*—At the close of 1932-33 the total Government of India stock of quinine sulphate purchased as such and extracted from Java and Burma barks amounted to 282,759 lbs. as against 290,149 lbs. in 1931-32. Of this total, 62,634 lbs. were at the Indian Museum, 215,513 lbs. at Mungpoo and 4,612 lbs. at Naduvattam. The total stock of cinchona febrifuge amounted to 22,965 lbs. as against 29,953 lbs. in 1931-32, including 12,390 lbs. at Mungpoo, 10,462 lbs. at Naduvattam and 112 lbs. at the Alipore jail.

Quinine from stock amounting to 11,369 lbs. were distributed as to the Punjab 7,768 lbs., U. P. 1,887 lbs., N.-W. F. P. 326 lbs., Central India 504 lbs., Delhi 236 lbs., Baluchistan 92 lbs. and Sind 4 lbs. Cinchona febrifuge sold by the Bengal Government on Government of India account amounted to 8,968 lbs.

*Government Cinchona Plantations and Factory in Bengal.*—A total of 1,445,762 lbs. of Bengal bark was harvested but only 1,258,454 lbs. were utilised in the factory, of which 1,137,066 lbs. belonged to the Bengal Government and the balance to the Government of India. Factory production included 46,220 lbs. of quinine sulphate at a cost of Rs. 2.721 per lb. and 25,023

The spleen rates during the autumn months were lower than these; the reverse was the case in 1931.

Scout organisations (Sewa Samiti and Baden Powell) and Junior Red Cross Groups have been organised for anti-malarial work in 33 districts.

Eighteen municipalities have adopted anti-malarial bye-laws regulating the digging of excavations, etc.

"Water boatmen" (Family *Notonectidae*) were extensively experimented with in Lucknow as a substitute for petrol; although they proved to be fairly effective in destroying anopheline and culicine larvæ in the laboratory, the results were extremely variable in wells. The experiments were abandoned owing to shortage of supplies.

Courses of instruction, including field work, were given to one M. O. H., and 6 students of the D. P. H. and L. P. H. classes. Short courses of advanced training were given to 15 M. O. Hs. and 36 students of the sanitary inspectors' class were given an elementary training in practical anti-malarial methods.

**B.&O.**—Anti-malarial surveys of the towns of Purnea and Madhubani were carried out in addition to a spleen census in 1,057 villages in the districts of Ranchi, Singhbhum, Sambalpur, Cuttack, Angul, Puri, Balasore and Manbhum. Of the 15,348 children examined, 1,829 in 467 villages showed splenic enlargements.

**C.P.**—An epidemic dispensary was at work in the Melghat forest area and the adjoining *Ryotwari* tract of Amraoti district. Routine anti-malarial works were continued in Pachmarhi, Nagpur Civil Station, Jabulpore, Khandwa and Burhanpur towns.

**Bombay.**—The control of the anti-malarial staff was transferred from the Surgeon General to the D. P. H. 29 subordinate medical service officers were appointed for the treatment of malaria cases and for visiting malarious tracts. A total of 2,855 villages were visited and 46,872 cases of malaria were treated. Of the 44,279 children examined, 15,894 had enlarged spleens. In Dharwar district, of the 1,062 school children available for inspection, 149 had enlarged spleens; and in the reformatory school at Yeravda the numbers were 2,515 and 48 respectively. The A. D. P. H., Central Registration District, carried out malarial surveys of 11 villages between Poona and Khadakwasla and of certain malarious tracts in the Nira canal area.

**Madras.**—The temporary malaria staff was abolished in February, 1932, but in order to continue the malarial programme a specially trained reserve first-class health officer was appointed as malaria officer. Owing to financial stringency, anti-malarial operations were almost entirely suspended in municipal and rural areas except in Vizagapatam town, Rameswaram island and in two villages in Ganjam district. Estimates for the sub-soil drainage of the more important channels and swamps in Coonoor were under scrutiny. In the Vizagapatam Agency, anti-malarial measures were in progress in Koraput, Pottanghi, Padwa and Chintapalli, whilst a scheme for sub-soil drainage of the breeding grounds in Koraput, estimated to cost Rs. 38,900, was sanctioned by Government but for lack of funds was held in abeyance.

**Assam.**—The present policy is that municipalities and local boards, when they undertake anti-malaria work, must set apart a lump sum and this is

in 1932 suggested the development of indigenous malaria in this well-known health resort in the Nilgiris. In the districts of Cuddapah, Kurnool, South Kanara and Bellary, where a scheme for the free distribution of quinine has been in force for some years, a markedly reduced incidence of fevers, —or more correctly malaria,—has occurred.

*Assam.*—The D. P. H. reports :—

“It seems reasonable to take one-third of the total fever deaths to be due to malaria. The case mortality rate in malaria is very low, probably about 1%. On these calculations, the total number of persons suffering from malaria during the year is 3,273,700 or nearly two-fifth of the total population under registration.”

*Burma.*—In towns, malaria deaths totalled 1,725, giving a rate of 1.2 p.m. which is less than the figures for the previous year and the quinquennial mean. High death rates were recorded in the towns of Minbya (11 p.m.), Salin (8), Shwegyin (8), Moulmeingyun (6) and Kyangin (5).

### Anti-malarial Measures.

19. *N.-W.F.P.*—Three compcunders were detailed for malaria duty in the rural areas of Peshawar district. The local Government sanctioned a grant-in-aid of Rs. 1,000 for anti-malarial measures in Kohat Cantonment and the adjoining villages.

*Punjab.*—In addition to the distribution of quinine, details of which will be found in paragraph 20, routine measures such as the filling of small depressions in the vicinity of houses, etc., were carried out.

*Delhi.*—Measures carried out in urban areas included the systematic cleaning of water channels and flooded areas, the use of paris green, crude oil mixture, mops, oil balls and bags in suitable places and the drainage of stagnant water. Anopheline mosquitoes identified included *A. Stephensi*, *A. subpictus* and *A. cuicifacies*. In rural areas, in addition to quininisation, oils and paris green were used during the malarial season.

*U.P.*—Anti-malarial measures were organised and controlled by the malarial branch of the Public Health Department under the direction of an A.D.P.H. assisted by two assistant malaria officers. Anti-malarial works at Banbassa, Sarda canal head-works and in the Tarai and Bhabar government estates were continued and surveys of Gorakhpur and Ranibagh were carried out. In order to prevent the breeding of mosquitoes, it was proposed to flush the Ghaziuddin Hyder canal with water from the Sarda canal. A survey of the Sarda canal area in the districts of Shahjahanpur, Pilibhit, Bareilly, Hardoi, Lucknow and Unao recorded spleen rates of 16.9% in village areas under canal irrigation as against 16% in 1931, and only 4.4% in others as compared with 8% in 1931. In many villages on the Lucknow and Sandila canal branches (Lucknow and Hardoi districts), spleen rates varied from 30% to 45.5%. In order to determine the seasonal prevalence of malaria among school children, especially in spring and autumn, splenic indices were taken in the districts which employed M. O. Hs. The districts of Nainital, Mirzapur, Unao and Lucknow in the spring recorded high spleen rates varying between 11% and 23%; in Fatehpur, Rae Bareilly, Muttra, Moradabad Bara Banki and Allahabad between 7% and 10%; in others below 5%



TABLE II (xxx).

	Cases.			Percentage to total cases treated.		
	1932.	1931.	Mean 1927-31.	1932.	1931.	Mean 1927-31.
<b>Total</b>	<b>10,883,599</b>	<b>11,492,583</b>	<b>9,759,384</b>	<b>15.0</b>	<b>15.4</b>	<b>15.4</b>
N.-W. F. P.		366,278	324,431	25.1	23.5	23.8
Punjab	1,876,293	2,133,153	1,791,078	13.2	15.3	15.1
Delhi	139,770	129,055	102,533	13.8	13.0	13.7
U. P.	1,018,305	1,365,032	1,051,454	12.5	16.8	15.2
B. & O.	1,057,842	1,235,421	1,058,025	14.6	16.3	15.4
Bengal	2,791,780	2,756,303	2,305,623	29.6	29.0	26.5
C. P.	404,667	430,804	376,451	11.5	12.4	12.2
Bombay	939,468	992,945	972,159	17.3	18.0	18.8
Madras	1,031,363	1,076,406	964,553	6.4	7.0	7.5
Coorg	105,715	97,178	90,776	35.7	37.7	42.5
Assam	697,072	521,573	373,370	27.7	22.0	18.4
Burma	383,114	388,435	348,911	12.6	13.1	12.9

*Punjab.*—The usual malaria forecast anticipated localised mild epidemics in the districts of Jullundur, Shahpur, Jhang, Muzaffargarh and parts of D. G. Khan.

*U.P.*—Deaths totalled 782,230 (16 p.m.) as against 932,796 (19 p.m.) in 1931. In other words, 92% of the total fever deaths were registered as malaria but the reliability of this figure is doubtful. The rural areas of Rohilkhand division reported the highest death rates; those of Gorakhpur, Benares and Fyzabad divisions the lowest.

*B.&O.*—Most of Orissa and the districts of Singhbhum, Purnea and Bhagalpur are well-known malarious areas.

*Bengal.*—Deaths numbered 327,386 and the death rate was 6.6 p.m. High death rates were recorded in the districts of Nadia 19 p.m., Rajshahi 18, Jessore 17, Malda 15, Dinajpur 13, Murshidabad 12 and Birbhum 11.

*C.P.*—The high fever mortality in October was ascribed to the prevalence of malaria. Judging from attendances at hospitals and dispensaries, the districts which suffered most from malaria were Saugor 35,802 cases, Nagpur 33,399, Hoshangabad 30,082, Chanda 28,494, Buldana 28,087 and Chhindwara 27,521.

*Bombay.*—A total of 21,038 deaths was recorded; in the Central Registration District 9,381; Southern 5,939; Northern 3,619; and Sind 2,025. In Bombay city only 74 malaria deaths were recorded. The provincial death rate was 1.0 p.m.; the rural rate 1.0 p.m. and the urban 0.6 p.m. The highest rural rates were recorded in the districts of Nasik (4 p.m.), Poona (3), Kanara (2), West Khandesh (2), Dharwar (2) and Ahmednagar (2) and the highest urban rates in Jambusar (9), Larkana (8), Rohri (7), Kotri (7) and Dholka (5).

*Madras.*—The continued increases in the number of cases treated in the Government hospitals, Coonoor from 508 in 1930, to 1,398 in 1931 and 2,253

24-Parganas (9) and in Calcutta (3). The fever mortality was highest in December and lowest in June. The rural death rate was 15 p.m. and the urban rate 4 p.m.

*C.P.*—Fever deaths totalled 237,743 with a rate of 15 p.m. as compared with 294,839 in 1931. October and July were the months of highest and lowest mortality. The high mortality recorded in April, May and June was due to influenza and that in the months of September to December to the prevalence of malaria. In rural areas the death rate was 16 p.m. as compared with 10 p.m. in urban areas. The districts of Saugor (23 p.m.), Drug (21), Hoshangabad (20) and Nimar (20) recorded the highest death rates, whilst Berar and Wardha districts suffered least.

*Bombay.*—The provincial fever death rate of 9 p.m. was the same as in 1931 but was lower than the quinquennial mean. The districts of Broach (16 p.m.), East Khandesh (14), Larkana (14), Panch Mahals (13), Sukkur (13), Ahmedabad (12), Kaira (11), Dadu (11) and U. S. Frontier (11) returned the highest rates.

*Madras.*—Deaths numbered 291,416 as against 331,834 in 1931. In the districts of Ganjam (13 p.m.), Vizagapatam (14), Godavari East (10) and Kurnool (10) the fever mortality was high chiefly owing to the prevalence of malaria. As compared with 1931, decreased death rates were recorded in Vizagapatam, Cuddapah and Kurnool probably due in part to the more effective quininisation of these districts. The district of Tanjore (2 p.m.) again reported a low death rate and little or no malaria, although it contains large irrigated areas. The rural rate was 6 p.m. and the urban rate 3 p.m.

*Assam.*—98,211 or 65% of the total deaths were registered as "fevers" against 93,189 in 1931. The provincial death rate for the group was 12 p.m.; the highest mortality was registered in July and the lowest in March. Goalpara district (22 p.m.) returned the highest death rate partly owing to floods in the Brahmaputra river with a consequent spread of fevers and partly to the prevalence of kala-azar. The district of Lakhimpur (9 p.m.) which was least affected by kala-azar recorded the lowest rate.

*Burma.*—The provincial fever death rate was 6 p.m., total deaths numbering 75,897 or nearly 36% of the total mortality. The mortality was highest in December and lowest in June. The death rate was 7 p.m. in rural and 3 p.m. in urban areas. Of the rural areas, Minbu (14 p.m.), Shwebo (13), Pakokku (11), Kyaukse (11), Akyab (10), Mandalay (10), Sandoway (10) and Prome (10) recorded the highest rates; all these districts are said to be highly malarious.

### **Malaria.**

18. Nearly 11 million diagnosed cases of malaria were treated in hospitals and dispensaries as compared with about 11½ millions in 1931 and every province with the exception of N.-W. F. P., Delhi, Bengal and Assam recorded decreases. Table II (xxx) gives the numbers of malaria cases and their percentages to total cases treated in each province during the years 1931 and 1932.



### Fevers.

17. A total of 3,456,144 deaths were ascribed to this cause, against 3,956,100 in 1931 and 3,680,165 the decennial mean. Out of this total, 3,272,598 deaths were registered in rural and 183,546 in urban areas, as against 3,761,465 and 194,635 in 1931; and 1,811,648 were males and 1,644,496 females. The death rate was 12.9 p.m. as compared with 14.9 the rate both for 1931 and the decennial mean. Ajmer-Merwara again recorded the highest rate of 19 p.m.; other high figures were Coorg 18, U. P. 17, Punjab 16, N.-W. F. P. 16, C. P. 15, B. & O. 15 and Bengal 14. Burma 6.2 and Madras Presidency 6.3 as usual returned much the lowest rates.

The rural death-rate was 13.5 p.m. and the urban 6.9 p.m. as against 15.6 and 7.4 respectively in 1931. Rural rates exceeded the urban in every province but, as pointed out previously, registration in the former areas is much more defective than in the latter. Table II (xxix) gives an analysis of the 'fevers' figures for a few provinces but, for various reasons including faulty diagnosis, these cannot be taken as an accurate representation of actual facts. They do, however, give a rough indication of the high incidence of malaria in certain areas.

*N.-W. F. P.*—Fever deaths totalled 38,582, the provincial death rate being 16 p.m. District rates varied between 23 p.m. in Kohat, 22 in Bannu and 11 in Peshawar. Among towns, the high rate of 26 p.m. was recorded in the notified area of Lakki in Bannu district.

*Punjab.*—A total of 388,427 deaths, as against 416,974 in 1931, was recorded, giving a rate of 16 p.m. The rural death rate was 18, as against 10 in urban areas. This variation was due chiefly to the prevalence of fevers in the rural districts of Karnal (26 p.m.), Gujranwala (23), Mianwali (22), Hoshiarpur (22) and Muzaffargarh (21). The lowest rates were recorded in the districts of Simla (7), Ambala (12), Lahore (13), Jhang (13) and Ludhiana (14). The mortality was highest in January and lowest in July.

*Delhi.*—Deaths numbered 7,305, the death rate being 11 p.m. In rural areas the death rate was 17 as against 9 in urban areas. The fever death rate in Delhi city was 10 p.m.

*U. P.*—The districts of Bareilly (29 p.m.), Budaun (28), Moradabad (27) and Pilibhit (26) recorded the highest death rates; Ballia (9), Gorakhpur (11) and Basti (12) reported the lowest rates. Among towns, Jalesar in the Etah district (37), Mau in Jhansi district (35), Debai in Bulandshahr district (29) and Aonla in Bareilly district (28) were most severely infected. The fever mortality was highest in June and lowest in August.

*B. & O.*—The highest rates were recorded in the districts of Palamau (21 p.m.), Angul (18) and Purnea (18); and in the towns of Gaya (18), Tikari (18) and Revelganj (15).

*Bengal.*—Of the total deaths, 195,331 were recorded in the Rajshahi division, 160,438 in Dacca division, 143,249 in Presidency division, 113,781 in Burdwan division and 79,114 in Chittagong division. The highest rates were recorded in the districts of Rajshahi (23 p.m.), Nadia (23), Birbhum (22), Dinajpur (22) and Jessore (21); the lowest in Howrah (5), Bakarganj (8),

TABLE II (xxviii).

Vaccinal condition of patients treated at medical institutions in Bengal.

	Vaccinated as shown by presence of one or more than single clearities.	Admissions from sample.	Stated to have been fully vaccinated bearing no vaccination mark.	Stated to be unvaccinated or but have been vaccinated during fully bearing no vaccination mark.	Previously vaccinated but have been unvaccinated during fully bearing no vaccination mark.		Medi-Modi-	Dis-creta-	Semi-con- fluent.	Con- fluent.	Hamor- rhagic.	Age.				
												Under 1 year.	1 year to 10.	10 years to 20.	Above 20.	
Total	360	189	35	124	6	6	24	123	77	106	30	1	25	37	102	135
Burdwan	10	1	..	18	..	..	..	1	7	10	1	..	..	9	8	2
Birbhum	2	..	..	1	..	1	1	1	..	..	..	..	1	..	1	..
Howrah	84	8	1	25	..	..	6	10	11	4	3	..	4	2	7	21
Calcutta	255	142	30	74	5	4	7	84	57	85	22	..	10	21	118	100
Khulna	2	1	1	..	..	..	1	..	..	1	..	..	..	..	2	..
Dinajpur	1	1	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Darjeeling	1	1	..	..	..	..	1	..	..	..	..	..	..	..	1	..
Rangpur	1	..	1	..	..	..	..	1	..	..	..	..	..	..	1	..
Dacca	4	4	..	..	..	..	2	..	2	..	..	..	..	..	3	1
Mymensingh	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Fardpur	33	31	..	2	..	..	..	26	..	4	3	..	8	5	16	9
Bakarganj	6	..	..	4	1	1	4	..	..	2	..	..	1	1	3	1
Tippera	2	..	2	..	..	..	2	..	..	..	..	..	..	..	2	..

proper Kanara district suffered most with 447 deaths giving a rate of 1.1 p.m. Deaths among infants numbered 448; those among children between 1-10 years 1,047. The incidence of the disease was highest in April.

*Madras.*—The death rate rose slightly, but was still one of the lowest recorded during the decennium 1923-32. The districts of South Arcot (1,568), Tanjore (671), Ramnad (588) and Madura (536) recorded the largest numbers of deaths; whilst in the districts of Guntur, Cuddapah and East and West Godavari the numbers varied between 1 and 8 deaths only. Of the 82 municipalities, 37 were entirely free. The comparative freedom of this province from the virulent epidemic which was in evidence in nearly every other part of India was ascribed to the thoroughness with which vaccination had been carried out during past years.

*Assam.*—The death rate rose slightly owing to an increased prevalence of infection in the districts of Goalpara and Kamrup but remained below the decennial mean. The highest death rate was recorded in Goalpara district (0.3 p.m.); the districts of Cachar and Nowgong remained free; and in other districts the mortality was below the provincial rate and the decennial mean. Rural areas recorded 625 deaths as compared with 6 only in urban areas. Of the 25 towns 20 reported no deaths. The total deaths included 56 among infants and 94 among children between the ages of 1-10 years.

*Burma.*—The disease was most prevalent in the towns of Mandalay and Rangoon and in the districts of Mandalay and Lower Chindwin. The peak incidence was reached in April and May. Of the total, 301 deaths were among infants and 748 among children aged 1-10 years. Urban areas suffered more than the rural areas.

### (c) Isolation Hospitals.

Such information as is available of the vaccinal history of smallpox patients treated in institutions is given in Table II (xxvii).

TABLE II (xxvii).

	Smallpox patients.	One or more vaccination scars.	Stated to have been successfully vaccinated but no vaccination scar present.	Stated to have been unvaccinated or vaccinated unsuccessfully but no vaccination scar present.	Previously unvaccinated but vaccinated during incubation of smallpox.	Stated to have been successfully re-vaccinated.
<b>Total</b>	<b>4,493*</b>	<b>2,658</b>	<b>566</b>	<b>1,217</b>	<b>26</b>	<b>14</b>
U. P.	117	72	2	31	11	1
Bengal	360	189	35	124	6	6
C. P.	262	239	10	13	..	..
Bombay	88	15	1	72	..	..
Madras	2,271	1,327	518	410	9	7
Assam	17*	2	..	3	..	..
Burma	1,378	814	..	564	..	..

\* Particulars of 12 cases are not available.

*Punjab*.—Every district was infected and the rural districts of Sialkot (0·5 p.m.), Hissar (0·4), Shahpur (0·3), D. G. Khan (0·3) and Jhelum (0·3) returned the highest death rates. High urban mortality was ascribed partly to more accurate records and partly to overcrowding. The female death rate exceeded that of males. Of the total, 1,881 deaths occurred among infants, 2,303 among children aged 1-10 years and 1,000 among those above 10 years of age. The increased incidence during the year under review was said to be a manifestation of the periodic wave of infection to which the province is liable about every 5 years.

*Delhi*.—Although only sporadic infection was reported, a total of 679 cases and 183 deaths were registered. Of these, 149 cases and 60 deaths occurred among children under 1 year; 283 and 91 among those between 1-5 years; 88 and 15 among those between 5-10 years and 159 and 17 among those above 10 years. Of the total, 594 cases and 165 deaths were registered in December.

*U. P.*—The highest death rates were returned from the districts of Ghazipur (0·7 p.m.), Azamgarh (0·2) and Ballia (0·2) whilst the districts of Mainpuri, Bareilly, Pilibhit, Jalaon, Banda and Partabgarh were entirely free. Of the town, Mau (5·5 p.m.) in Azamgarh district, Gahwar (2·4) in Ghazipur district and Basti (1·5) recorded the highest rates. Deaths totalled 2,779 and of these 604 were recorded among infants; 1,039 among children between the ages 1-10 years; and the rest among adults. June and October were the months of highest and lowest mortality.

*B. & O.*—The usual quinquennial rise occurred in the morbidity and mortality curves. The latter reached its maximum in June and its minimum in October. The highest death rates were recorded in the districts of Sambalpur (1·5 p.m.), Shahabad (1·0), Saran (1·0) and Puri (1·0); the districts in the Chota Nagpur division especially those of Singhbhum, Manbhum and Hazaribagh reported low rates; Angul district remained free. The towns of Sitamarhi (2·4 p.m.), Madhubani (1·5) and Gaya (1·4) were worst affected.

*Bengal*.—Rangpur district (0·7 p.m.) recorded the highest death rate and Darjeeling the lowest and as compared with 1931 nearly every district reported low rates. The maximum mortality was 2·9 per 10,000, this being recorded in May, and the minimum of 0·5 was recorded during September, October and November. Compared with the decennial mean, the death rate was lower in every month. The urban areas in Burdwan division with an average of 31 deaths per town were the worst affected. Deaths among infants totalled 170; those among children aged between 1-10 years 398. The percentage of deaths among infants was highest in Birbhum district (10·3%); other high figures were 6·5% in Dacca and 6·4% in Calcutta.

*C. P.*—The reported incidence was generally low and the largest number of deaths, 143, was recorded in Saugor district. Of the total recorded deaths, 453 occurred in rural and 121 in urban areas; 175 occurred among infants and 265 among those aged 1-10 years; 523 were registered during January to August and only 51 during September to December.

*Bombay*.—Every Registration District was affected except the Northern which kept practically free. Sind suffered severely whilst in the Presidency

TABLE II (xxv).

	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.	
	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.
<b>Total</b>	<b>37,326</b>	<b>29,532</b>	<b>35,267</b>	<b>43,264</b>	<b>9,641</b>	<b>19,205</b>	<b>6,043</b>	<b>22,690</b>
N.-W. F. P. . . . .	20	98	23	134	1	136	96	466
Kashmir . . . . .			34	34			25	18
Punjab . . . . .	2,102	1,750	2,458	3,723	1,234	1,334	639	5,648
Punjab States . . . . .	201	15	236	36	11		38	17
Delhi . . . . .	66	23	29	2	2		1	619
U. P. . . . .	1,143	844	1,618	1,394	370	345	211	213
B. & O. . . . .	5,542	6,917	8,245	15,825	2,308	5,338	1,162	5,696
Bengal . . . . .	6,351		5,027	4,418	1,152	930	660	1,595
Bengal States . . . . .	56	110	118	270	24	143	31	59
Madras . . . . .	4,144	4,633	2,542	3,411	1,723	5,564	1,640	4,639
Hyderabad . . . . .	917	558	609	459	190		64	111
Mysore . . . . .	139	316	195	370	107	491	58	115
Bombay . . . . .	4,855	3,091	4,216	4,783	809	1,931	589	1,676
Bombay States . . . . .	885	147	320	98	85	41	104	10
Assam . . . . .	137	75	329	294	102		52	169
Burma . . . . .	256	3,702	570	5,348	122	1,224	189	556
Other Indian States . . . . .		2,795	460	1,355	302	776	351	591
Ajmer-Merwara . . . . .	96		34	4		11	25	1
C. P. . . . .	9,377	845	7,860	1,341	1,023	515	110	157
C. I. Agency . . . . .	170	12	344	38	62	18		31

As usual, urban populations suffered more severely than rural except in Assam and Ajmer-Merwara. The two rates in the U. P., B. & O. and Bombay were either equal or nearly so. Table II (xxvi) compares the death rates in rural and urban populations in the different provinces during the years 1931 and 1932.

TABLE II (xxvi).

	Rural.				Urban.			
	1931.		1932.		1931.		1932.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
<b>British India . . . . .</b>	<b>31,830</b>	<b>0.1</b>	<b>36,612</b>	<b>0.1</b>	<b>5,442</b>	<b>0.2</b>	<b>8,313</b>	<b>0.3</b>
N.-W. F. P. . . . .	59	..	355	0.2	3	..	158	0.5
Punjab . . . . .	3,067	0.1	3,276	0.2	579	0.2	1,908	0.6
Delhi . . . . .	9	0.1	11	..	17	..	172	0.4
U. P. . . . .	2,907	0.1	2,362	0.1	448	0.1	477	0.1
B. & O. . . . .	7,712	0.2	15,825	0.4	316	0.2	641	0.4
Bengal . . . . .	7,127	0.1	6,716	0.1	2,080	0.6	1,194	0.3
C. P. . . . .	3,613	0.3	453	..	973	0.6	121	0.1
Bombay . . . . .	1,571	0.1	2,078	..	302	0.1	621	0.1
Madras . . . . .	4,044	0.1	3,761	0.1	616	..	1,602	0.2
Coorg . . . . .	24	0.1	..	..	..	..	1	0.1
Assam . . . . .	571	0.1	625	0.1	23	0.1	6	..
Burma . . . . .	438	..	1,106	0.1	52	..	1,378	1.0
Ajmer-Merwara . . . . .	688	1.8	104	0.3	33	0.2	34	0.2

## (b) Provincial.

N.-W.F.P.—A total of 867 cases with 513 deaths were recorded as against 139 and 62 in 1931. In addition, 7 cases with 2 deaths occurred in the Kurram Agency. Hazara district reported 334 deaths, Peshawar 137, D. I. Khan 19 and Bannu 2 whilst Kohat district was again free. The highest mortality was registered in December and lowest in March and April.



Total deaths during 1932 increased from 37,272 in 1931 to 44,925, the death rate rising from 0.1 p.m. to 0.2 p.m. The provinces of Bengal, Assam, U. P. and Burma largely contributed to this increase; on the other hand, the mortality curves in the Punjab, C. P., Bombay, Coorg and Ajmer-Merwara decreased. Table II (xxiv) gives total smallpox deaths and death rates for British India and individual provinces together with rates of successful vaccinations per 1,000 of population. The table shows that vaccination work has been best in the Punjab and Delhi Provinces during the past 2 years; the U. P., B. & O., C. P., Bombay and Madras figures are disappointingly low.

TABLE II (xxiv).

	Deaths.		Death rate p.m.			Rate of successful vaccinations per 1,000 of population	
	1931.	1932.	1931.	1932.	Mean 1922-31.	1932-33.	1931-32
British India	37,272	44,925	0.1	0.2	0.3	51.3	42.7
N.-W. F. P.	62	513		0.2	0.1	76.0	53.0
Punjab	3,646	5,184	0.2	0.2	0.3	101.3	54.1
Delhi	26	183		0.3	0.3	116.7	36.0
U. P.	3,355	2,779	0.1		0.1	30.0	28.3
B. & O.	3,028	16,486	0.2	0.4	0.4	34.3	29.7
	9,207	7,910	0.2	0.2	0.4	81.2	74.6
C. P.	4,586	574	3.3		0.2	34.3	32.4
Bombay	1,873	2,899	0.1	0.1	0.4	34.9	27.9
Madras	4,660	5,363	0.1	0.1	0.3	38.7	32.7
Coorg	24	1	0.1		0.1	68.5	60.4
Assam	594	631	0.1	0.1	0.5	54.2	47.1
	490	2,464		0.2	0.2	53.9	44.2
Ajmer-Merwara	721	138		0.2	0.9	39.9	31.8

The peak of the smallpox mortality curve occurred as usual in May and June whilst the minimum was recorded in October and November. The seasonal incidence in each province is given in Table F. in Appendix II on page 361; reported cases for each quarter are detailed in Table II (xxv). These figures go to corroborate the conclusion arrived at some years ago that smallpox tends to become more prevalent and more virulent during the drier months of the year, when conditions of low relative humidity exist. It follows also that by noting changes in relative humidity, especially in dry areas, this indicator can be used to forecast epidemics of smallpox well in advance of their occurrence. Such observations should provide a valuable weapon to vaccination departments in India in their campaign against the disease.

All countries in which vaccination has been extensively practised have given an unequivocal answer in favour of the practice and this preventive measure, indeed, has been described as "the greatest physical good ever given by science to the world". The tremendous progress made within recent years in vaccination in a number of other countries in the Far East has also made it evident that further reduction in the incidence of smallpox is without doubt attainable. In the Netherlands East Indies, for instance, the annual number of vaccinations and revaccinations rose from 58,500 during 1890-1899 to 1,690,000 in 1899-1909, then to 7,270,000 during 1909-1919 and to the remarkable figure of 10,280,000 for the years 1920-27. As a result of this continuous vaccination campaign, smallpox is now practically non-existent in these islands; during 1932, only 39 cases with 2 deaths were recorded as compared with 3,500 cases and 800 deaths in 1913. Particularly during the last 10-15 years, available evidence in India has gone to show that if only a larger proportion of the population were successfully vaccinated, similar decreases in the incidence of smallpox in India could be achieved: in fact, large reductions in smallpox have already been recorded in one province. Recent researches indicate that the personal immunity of the individual cannot be expected to confer "herd immunity", but even the relative immunity conferred by successful vaccination is a method that can be safely employed on a large scale as a preventive of smallpox. From the eleventh century onwards, the evidence in favour of preventive inoculation and vaccination has been indisputable and, so long as smallpox remains an endemic disease in India, it is necessary to carry out the safe method of vaccination to the widest possible extent. In a tropical country like India, the difficulties are great but these are gradually being overcome by patient research and by active organisation. The maintenance of potency in the seed lymph has already been placed on a satisfactory basis; the problem of the distribution of potent lymph to the remotest villages has also reached a satisfactory solution; and other problems are receiving constant attention. It only remains for legislatures and Governments to lend support to Public Health Departments by making vaccination and revaccination compulsory in order to obtain a progressive diminution in the incidence of this easily preventible disease.

The subject of post-vaccinal encephalitis has received considerable attention during recent years in a number of the countries of the West and the Health Section of the League of Nations has also given it much consideration. In England, exhaustive investigations have been made by two committees appointed by the Ministry of Health. During the past 4-5 years, vaccination staffs in this country have been on the look out for cases of this post-vaccinal nervous disturbance but so far not a single case has been reported. "Where vaccination is being performed as a protection against a deadly disease like *variola major* (which is the usual type found in India), a very occasional death from post-vaccinal encephalitis would not be a valid argument against vaccination". These words have recently been used by a distinguished but very critical public health expert and are especially *apropos* in discussing vaccination in this country. But in the absence of recorded cases, the matter is so far only of academic interest to those engaged in that work in India, although this must not be taken to imply that a vigilant watch for this nervous condition need no longer be maintained.

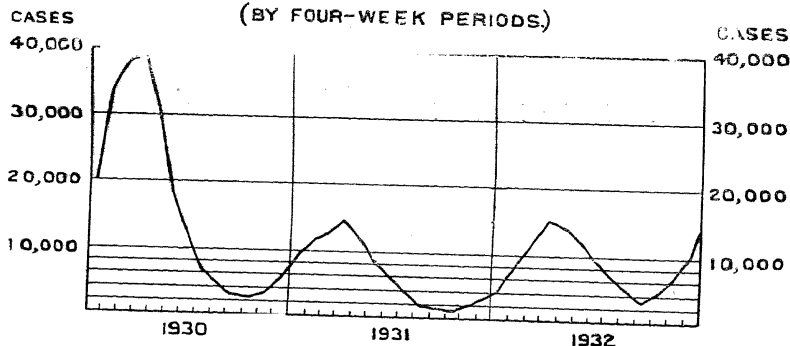
TABLE II (xxiii).

Quinquennium.	No. of deaths.	Average annual no. of deaths.
1911-15 .	405,919	81,184
1916-20 .	453,401	90,680
1921-25 .	266,732	53,346
1926-30 .	477,084	95,417
1931 . .		37,272
1932 . .		44,925

Although every provincial health department has for many years waged a continual fight against the general apathy which exists even in the face of virulent epidemics, so long as vaccination and revaccination are not made compulsory throughout India, the percentage of unprotected persons will remain high and the incidence of this fell disease will continue at a high level. At present compulsory vaccination is by no means universal, although it is now in force in most urban areas.

Graph No. 9 shows the periodicity of the disease during the last 3 years. It also indicates the marked reduction in the incidence of smallpox during 1931 and 1932. As usual, the peak incidence was recorded in April and May. The rise in the later months of 1932 foreshadows the increased incidence which has been recorded in the early months of 1933.

No 9  
CASES REPORTED DURING THE  
YEARS 1930, 1931 & 1932  
(BY FOUR-WEEK PERIODS)



No. 9.—Reproduced from the League's Weekly Epidemiological Record for w/e  
21st February 1934. (R. H. 417.)

TABLE II (xxi).

	1926.	1927.	1928.	1929.	1930.	1931.	1932.
British India . . . .	219,158	221,556	163,675	148,068	231,386	88,380	114,691
England and Wales . . . .	10,146	14,767	12,420	10,968	11,839	5,664	2,039
Scotland . . . .	1	154	146	23	14	..	..
New Zealand . . . .	..	..	..	..	..	..	..
France . . . .	554	410	158	84	217	104	134
Germany . . . .	7	4	2	2	2	..	3
Italy . . . .	112	60	62	6	..	..	1
Norway . . . .	..	2	..	..	..	..	1
Sweden . . . .	1	..	..	..	1	..	10
Switzerland . . . .	54	..	1	..	1	..	2
Egypt . . . .	2,676	240	20	26	14	10	600
Netherlands E. Indies . . . .	843	297	146	725	430	176	39
Ceylon . . . .	65	27	18	8	41	9	106
Japan . . . .	1,256	362	723	114	7	22	304
Siam . . . .	1,113	418	125	405	56	33	20
U. S. A. . . .	33,392	37,600	39,596	42,282	48,907	30,232	9,916

But the general position remains unsatisfactory. Table II (xxii) which gives the primary vaccinations and the mortality from smallpox per 1,000 of the population in British India, indicates the progressive reduction in the incidence of smallpox which has occurred but also makes clear the necessity for further active measures.

TABLE II (xxii).

	Vaccinations per 1,000.	Mortality per 1,000.
1878-1887	27	0.772
1888-1897	34	0.466
1898-1907	38	0.374
1908-1917	36	0.363
1918-1927	33	0.347
1928 .	37	0.399
1929 .	39	0.302
1930 .	37	0.302
1931 .	35	0.140
1932 .	37	0.170

The proportion of vaccinated persons, though higher in urban than in rural areas, is still far below the figure necessary to prevent epidemic outbreaks and, although total annual vaccination operations amount approximately to 15 millions or so, these are quite insufficient to ensure the immunity of the general population against infection.

In order to demonstrate still further the deplorable mortality caused by smallpox in India, the figures for total deaths recorded in British India for the five-yearly periods from 1911-30 are given in Table II (xxiii) along with the corresponding totals for 1931 and 1932. These figures give some degree of encouragement to those in charge of vaccination departments but indicate only too well the dire necessity for additional powers combined with greater activity in vaccination work.



killed included Wakema (9,691), Syriam (6,954), Moulmein (4,063), Henzada (3,826) and Bassein (2,034).

Preventive measures included the general cleaning of houses and streets, disinfection, segregation and voluntary evacuation of houses. Table II (xx) gives monthly details of the rats killed in Rangoon and of the recorded cases of plague.

TABLE II (xx).

	Examined.	Infected.	Percentage infected.	Human plague.	
					Deaths.
<b>Total</b>	<b>37,294</b>	<b>36</b>	<b>0.10</b>	<b>36</b>	<b>27</b>
January	2,490	2	0.08	3	1
February	2,888	1	0.04	9	8
March .	2,974	9	0.30	4	4
April .	2,651	5	0.19	7	6
May .	2,783	3	0.11	1	..
June .	3,342	5	0.15	3	2
July .	3,461	4	0.12	1	1
August	3,894	4	0.10	5	4
September	3,685				
October	2,543		0.08		
November	3,578		0.03		
December	3,005				

### Smallpox.

#### (a) General.

16. It is an unfortunate fact that India is still the chief endemic focus of smallpox in the whole world. Variola major continues to be the predominant type of the disease and, in consequence, the case mortality rules high although the recorded death rate for the population as a whole is as low as 0.2 p.m. Table II (xxi) gives comparative figures of reported cases in British India and certain other countries for the years 1926 to 1932.

India seems to have been familiar for many centuries past, both with smallpox and with attempts at its prevention. A short quotation from Dr. Goodall's recently published volume is pertinent in this connection. He writes :—

"At the present day it is recognised that the most efficacious defence against both the epidemic and endemic prevalence of an infectious disease is the immunisation of the population against that disease. In the case of one disease, smallpox, the practice known as variolation is of considerable antiquity. Doctors Wong and Wu have shown that it was introduced into China during the eleventh century, and we know that at about the same time it was being recommended, if not actually practised, in Europe. Doctors Wong and Wu are of the opinion that, like smallpox, variolation was introduced into China from India. When it was first practised in the latter country is not known, but tradition refers it to pre-Christian times. It is very probable that India was the primeval home of smallpox and that the disease and its preventive gradually spread eastward and westward from that country."

cial assistance from the I. R. F. A. Investigations were made into the recrudescence of infection from place to place and on the value of different preventive measures. No evidence was obtained to prove that chronic or resolving plague lesions in rats in the Cumbum Valley might develop into acute plague during the subsequent plague season. The results of about 150 experiments carried out in plague infected houses, 31 of which were conducted during the non-plague season, suggested the possibility that rat fleas aestivating in rat-burrows, even apart from rats, might be the off-season reservoir of plague. Another experiment performed in a controlled house showed that fleas, under conditions of strict starvation, could remain infective for as long as 63 days. This experiment added support to the previous suggestion and, being of great importance, is under repetition before a definite conclusion can be drawn in regard to this vexed question of plague recrudescence.

The use of cyanogas as an anti-plague measure was investigated and the results achieved indicated that fumigation with this gas was likely to become a reliable plague-preventive measure, particularly in endemic areas. These experimental researches were being continued.

Monthly flea-surveys have shown that in every epidemic the preponderant type of flea is the *X. cheopis*; the *X. astia* seems to play a more or less passive rôle.

Over 1,000 wild rodents have been examined for plague. Acute plague was found in one gerbille and in one field-mouse, while one gunomys showed scars on the spleen with adhesions. These few instances suggested that infection might spread from house-rats to field-rodents but there was no reason to believe that the latter were the off-season reservoirs of plague in the Cumbum Valley, especially as it was noted that the fleas collected from these field rodents were mostly *X. astia* (1,292 out of 1,320).

The conditions under which rats and fleas are conveyed from place to place in grain bags and other infected articles were being studied and the most efficient methods for dealing with this problem in the field were being worked out. The Travancore Government, whose territory adjoins the Cumbum Valley, have co-operated willingly in this piece of work.

The rat-proofing of godowns as a permanent anti-plague measure has been started in Cumbum. Four godowns had been built and 3 others were under construction. The local bodies in plague-infected areas could add great weight to this method of plague prevention if they insisted on rat-proof godowns as a condition for the renewal of the licences required by rice-mills.

**Burma.**—A total of 56,015 persons were inoculated. Of the 17,836 performed in rural areas, 5,439 were in Meiktila, 2,258 in Thaton, 1,667 in Pegu, 1,656 in Tharrawaddy, 1,612 in Sagaing, 1,567 in Insein, 1,437 in Prome and 1,306 in Myitkyina. The urban total of 38,179 included 10,692 in Mandalay, 2,120 in Yenangyaung, 2,017 in Bassein, 1,979 in Henzada, 1,968 in Yamethin, 1,853 in Prome, 1,835 in Paungde and 1,814 in Monywa.

A total of 683,682 rats were killed including 647,088 in Rangoon. Except in the Hlegu Health Unit area and the Northern Shan States, no anti-rat measures were carried out in the rural areas. Other towns in which rats were

In the Southern Registration District, rat killing was carried out in 25 towns; these operations were conducted throughout the year in Belgaum, Nipani, Bijapur, Bagalkot, Sirsi, Sholapur, Barsi, Pandharpur, Malcolmpeth and Satara. Of the 364,499 rats killed, including 67,468 in Barsi town, 39,000 were examined and 127 were found infected. The weekly *bazaars* in 25 villages in the districts of Belgaum, Dharwar, Bijapur and Satara were held in open places outside the village limits in order to prevent the spread of infection to neighbouring villages. The district local boards of Belgaum, Dharwar, Bijapur, Sholapur and Satara appointed special inoculators in addition to those appointed by Government. In Belgaum district, private practitioners were paid at the rate of Rs. 15 per 100 inoculations done in villages other than their headquarters. In the Northern Registration District, 38,254 rats were killed in 5 towns; of the 16 rats examined in Bulsar town, 8 were found infected but, as a result of the systematic anti-rat campaign carried on during 1932, this town and other villages in the taluk remained entirely free of plague during 1933. In the Central Registration District, operations were carried on in 10 towns, rats killed totalling 209,734; only one of the 146 examined was infected. Although Sind was entirely free, 122,968 rats were killed in the towns of Karachi, Hyderabad, Larkana, Mirpur Khas and Tando Adam. In Bombay city, 655,416 rats were killed; of these 272,230 were examined and 691 found infected. Table II (xix) gives details along with the plague deaths recorded each month.

TABLE II (xix).

	Examined.	Infected.	Percentage infected.	Human deaths.
<b>Total .</b>	<b>272,230</b>	<b>691</b>	<b>0.25</b>	<b>37</b>
January	26,724	50	0.19	..
February	27,104	96	0.35	3
March .	23,882	129	0.54	8
April . . . . .	26,304	146	0.55	15
May . . . . .	16,453	59	0.36	5
June . . . . .	16,261	39	0.24	..
July . . . . .	19,060	27	0.14	..
August . . . . .	22,964	29	0.13	1
September . . . . .	21,207	38	0.18	4
October . . . . .	22,482	34	0.15	1
November . . . . .	24,464	21	0.08	..
December . . . . .	25,295	22	0.09	..

*Madras.*—In pursuance of G. O. Ms. No. 1563 P. H., dated 22nd July 1932, sanitary inspectors on plague duty, after a course of practical and theoretical training, were employed on inoculation work but as a measure of economy the plague staff was considerably reduced. With other preventive measures, 84,742 inoculations were performed but the sun-disinfection of grain was discontinued as this process could not be carried out thoroughly.

Field researches into the epidemiology of plague were carried out by the Research Health Officer in the Cumbum Valley of Madura district with finan-



*U. P.*—Of the total, 34,864 inoculations were performed by travelling dispensaries, 37,761 by the district health staffs and 34,726 by other agencies. The prophylactic value of plague vaccine is fully borne out by the fact that among groups of inoculated persons totalling 21,694 only 12 deaths were recorded giving a death rate of 0.5 p.m., whilst among the 1,030,533 uninoculated persons in the same areas, deaths numbered 1,497 giving a death rate of 1.4.

A sum of Rs. 1,423 was made available to district magistrates for anti-plague measures including evacuation of houses in affected areas.

Rat destruction was continued in the towns of Bareilly, Moradabad, Shah-jahanpur, Amroha, Saharanpur, Pilibhit, and Jahanabad, and was commenced in Hardwar and Kashipur municipalities, in Jaspur town and in Dundwala village in attempts to eradicate these chronic plague foci. Owing to financial stringency the anti-rat campaign was discontinued in Muzaffarnagar, Aligarh, Hathras, Muttra, Ghaziabad, Hapur, Bulandshahr, Sambhal and Meerut. Rats killed totalled 948,738, including 723,450 in Bareilly. Special anti-rat campaigns were carried out in 25 villages in Lucknow district through the agency of 13 Junior Red Cross Groups.

*B. & O.*—Anti-plague vaccine was stocked at Namkum and supplied on demand free of cost.

*C. P.*—Evacuation continued to be a favourite preventive measure. Of the total inoculations, 20,024 were performed by the medical staff, 20,895 by the public health staff and 983 by private practitioners; 12,033 were done in Hoshangabad district, 11,100 in Nagpur and 6,789 in Chhindwara. Temporary plague regulations under the Epidemic Diseases Act were sanctioned for the districts of Chhindwara and Nimar and in the towns of Seoni, Mandla, Hoshangabad, Harda, Seoni-Malwa, Sohagpur, Chhota Chhindwara, Gadawara and Piparia.

Rat destruction was practised as usual in the towns of Nagpur, Katol, Bhandara, Jubbulpore, Narsinghpur, Betul, Multai, Amraoti, Yeotmal, Digras and Malkapur. Referring to the absence of plague in Jubbulpore town, the Commissioner of Jubbulpore division remarks, "I am now convinced that the destruction of rats has definitely prevented plague breaking out".

Owing to financial stringency the number of epidemic dispensaries was reduced by 6 to 33.

*Bombay.*—The 11 special medical officers inoculated 417,657 persons; these included 246,146 in British territory and 171,511 in the Kolhapur and Deccan States. The numbers of inoculations done in the various districts were as follows:—

Bijapur	68,293	Kaira	-	-	-	2,199
Belgaum	59,982	Surat	-	-	-	1,968
Dharwar	55,941	Thana	-	-	-	1,153
Satara	36,158	Poona	-	-	-	769
Kanara	8,739	Bombay (Suburban)	-	-	-	101
Sholapur	5,463	Nasik	-	-	-	22
Ratnagiri	2,293	Kolaba	-	-	-	8
Bombay city	213	Jails.	-	-	-	2,844

*Burma.*—The death rate was the lowest on record. 81% of the total deaths were registered during the first quarter. The Arakan division and the districts of Tavoy and Mergui continued to remain free and other districts reporting no mortality included Pyapon, Amherst, Pakokku and Kyaukse. The district of Mandalay had 414 deaths, Prome (126), Tharrawaddy (196) and Thaton (91). The disease is said to have become endemic in Meiktila district although only 93 attacks with 72 deaths were recorded as against 131 and 93 in 1931. In the Tharrawaddy district, except for 2 cases, the infection was confined to the villages of Okpu and Sitkwin where the disease is said to recur annually. In Thaton district, the epidemic in Paung circle was ascribed to the custom of storing paddy in large quantities.

High urban death rates were recorded in Myanaung (6.6 p.m.), Shwegyin (5.6), Kyaikto (5.1), Gyobingauk (4.9), Magwe (4.5), Zigon (4.4) and Monywa (4.2).

(c) *Anti-plague measures.*

Table II (xviii) gives the numbers of inoculations performed in the various provinces.

TABLE II (xviii).

	1930.	1931.	1932.
N.-W. F. P.			
Punjab .	59,382	62,468	91,600
Delhi .	..	..	..
U. P.	42,801	147,986	107,351
B. & O.		67,940	
Bengal			
C. P. .	11,403	28,526	41,902
Bombay	109,400	74,288	246,146
Madras	55,594	50,768	84,742
Coorg. .		11,595	
Assam .			
Burma .	68,363	71,946	56,015
Ajmer-Merwara			

*Punjab.*—In addition to inoculation, intensive rat destruction was carried out during the off-season in all potential epidemic foci and in the villages in their immediate neighbourhood. In addition to *bhoosa battis*, cyano-dust was extensively used for the treatment of rat-burrows. Evacuation, fumigation and disinfection of infected houses were attended with marked success. In Hoshiarpur district, inoculations totalled 22,180; a district health association was formed with funds amounting to Rs. 9,000 raised by subscription for cleaning of the villages and for other preventive measures. In Lahore, 54,665 rats were destroyed and 4,900 rat burrows were fumigated; in Amritsar 212,983 and 4,937; in Sialkot 132,916 and 297; in Ferozepore 49,224 and 2,914; and in Lyallpur 30,816 and 1,882. In Ludhiana 33,157 rats were killed, in Rawalpindi 26,133 and in Sargodha 34,200.

*Delhi.*—Preventive measures were continued on the usual lines. Rats killed in urban areas totalled 331,763 and in rural areas 403,487.

*B. & O.*—The death rate was well below the figure for 1931 and the decennial mean. The disease, which ordinarily is confined to the winter months and dies out in the hot weather and in the rainy season, was practically confined to the districts north of the Ganges, *viz.*, Muzaffarpur (0.5 p.m.), Darbhanga (0.2) and Saran (0.3). The rural death rate was higher than that in urban areas. The districts in the 3 divisions of Orissa, Chota Nagpur and Patna, except for 1 death in Shahabad, and the districts of Champaran, Purnea and Santal Parganas remained entirely free.

*Bengal.*—Only 1 death was reported in Hooghly, Chinsura.

*C. P.*—Owing to the prevalence of the disease in the districts of Chhindwara (787 deaths), Nagpur (428), Betul (254) and Wardha (63) in the Nagpur division; in Amraoti (293) in Berar; and in Hoshangabad (220) of Jubbulpore division, the recorded mortality rose slightly. Mandla district reported only 11 deaths, Raipur 1 and Akola 1; the rest of the province remained entirely free. Towns suffered more than rural areas. Of the former, Pusa (9.3 p.m.), Jarud (8.7), Mowar (5.0), Sendurjana (4.9), Narkhed (4.4), Sausar (3.9) and Kelod (3.7) recorded high death rates. The largest number of villages in which deaths were recorded were in the districts of Chhindwara (193), Nagpur and Betul (88 each), Hoshangabad (63), Amraoti (36) and Wardha (15).

Only 1 death among the inoculated was reported in Umrer town.

*Bombay.*—Following a period of two years of quiescence, the death rate rose from 0.3 p.m. in 1930 and 0.2 in 1931 to 0.7 as against a quinquennial mean of 0.5. Infection was severe in the Southern Registration District; the district of Belgaum recorded 4,719 deaths, or 4.4 p.m.; Satara 3,646 or 3.1; Dharwar 2,986 or 2.7; and Bijapur 2,136 or 2.5. Elsewhere the incidence was low. The districts in Gujarat were lightly infected; those in Sind and the districts of East and West Khandesh and Ahmednagar remained entirely free. High urban death rates were recorded in Bagalkot (9.7 p.m.), Islampur (6.9), Hubli (4.9), Athani (4.8), Ashta (4.5), Bijapur (4.2), Karwar (2.5), Dharwar (2.3), Belgaum (2.2), Vengurla (2.1), Bulsar (1.8) and Kalyan (1.7). In the Southern Registration District the death rate was 2.5 p.m. as against 0.6 in 1931 and 1.4 the quinquennial mean; the rural rate was 2.6 and the urban 1.8. The largest number of infected villages (245) was recorded in the district of Belgaum but Bijapur district was also severely infected. Among 4,134 persons inoculated in the villages of Sampgaon taluka in Belgaum district 20 attacks with 5 deaths were reported.

*Madras.*—The death rate rose owing to an outbreak in Bellary district (175 deaths) and to increased prevalence of the disease in parts of the districts of Madura (952 deaths), North Arcot (82), Salem (194) and Coimbatore (120). Other districts recording deaths included Malabar 30, the Nilgiris 3 and South Kanara 3, Anantapur district 1 and 1 in Madras town. The rest of the Presidency remained free.

As the infected districts were all situated on the borders of Hyderabad, Mysore and Travancore States and the Bombay Presidency, a conference of the D. P. Hs. of Bombay, Mysore and Madras, with the Assistant Director, King Institute, was held in order to obtain co-ordinated action.

*Assam* as usual remained free.

(b) *Provincial.*

*N.-W. F. P.*—Remained free for the fifth year in succession.

*Punjab.*—Of a total of 29 districts only 10 were infected as against 7 in 1931; the worst infected were Hoshiarpur, Gurdaspur and Sialkot in the sub-montane area. In these 3 districts recorded figures were:—

	Deaths.	Rate p.m.	Mean 1927-31.
Hoshiarpur	619	0.60	0.50
Gurdaspur	908	0.94	0.75
Sialkot	398	0.41	0.38

Other district figures were Gujrat 65 deaths, Ferozepore 7, Amritsar 2, Karnal, Jullundur, Lahore and Shahpur 1 each. The incidence of the disease was higher in rural than in urban areas, the 3 large towns of Lahore, Amritsar and Multan remaining free throughout the year. Table II (xvii) gives particulars of plague incidence in rural and urban areas from 1924.

TABLE II (xvii).

	Rural.			Urban.		
	Villages infected.	Deaths.	Average per	Towns infected.	Deaths.	Average per town.
1924	6,646	237,036	35.7	107	14,225	132.9
1925	1,724	32,988	19.1	76	4,642	61.1
1926	5,024	98,377	19.6	113	9,910	87.7
1927	1,194	7,530	6.3	46	922	20.0
1928	856	7,412	8.7	34	870	25.6
1929	259	1,947	7.5	9	106	11.8
1930	89	542	6.1	2	12	6.0
1931	101	1,040	10.3	10	110	11.0
1932	325	1,871	5.8	14	132	9.4

*Delhi* continued to remain free.

*U. P.*—The provincial death rate was lower than that of 1931 and of the quinquennial mean. The south eastern districts of Ghazipur (1.9), Basti (1.4), Azamgarh (1.1), Ballia (0.9) and Gorakhpur (0.9) as usual suffered most, but Saharanpur (2.3), Bijnor (2.4), Bareilly (1.3) and Fyzabad (1.0) were also very badly infected. The 22 districts of Dehra-Dun, Bulandshah, Muttra, Agra, Mainpuri, Farrukhabad, Etawah, Cawnpore, Fatehpur, Jhansi, Jalaun, Hamirpur, Banda, Almora, Garhwal, Lucknow, Unao, Rae Bareilly, Gonda, Bahraich, Partabgarh and Bara Banki remained entirely free, whilst the recorded mortality in Meerut, Allahabad and Mirzapur was so small as to call for no remark. Rural areas suffered more than the urban, especially in the districts of Bijnor, Saharanpur, Ghazipur and Basti. High urban rates were recorded in Chandpur (14.6 p.m.), Bijnor district; Bisalpur (11.3), Pilibhit district; Kashipur (8.5), Nainital district; and Hardwar-Union (3.5). In 25 towns the number of deaths did not exceed 10, whilst 73 others remained entirely free. The seasonal incidence was as usual highest in February, March and April.

TABLE II (xv).

	Male.				Female.			
	1931.		1932.		1931.		1932.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
British India . . .	19,685	0.1	20,231	0.1	25,941	0.2	26,273	0.2
N.-W. F. P. . . .	522	..	865	0.1	628	..	1,188	0.1
Punjab . . . . .	..	..	..	..	1	..	..	..
Delhi . . . . .	..	..	..	..	..	..	..	..
U. P. . . . .	13,257	0.5	9,109	0.4	17,968	0.8	12,388	0.5
B. & O. . . . .	2,253	0.1	1,286	0.1	3,176	0.2	2,088	0.1
Bengal . . . . .	1	..	1	..	..	..	..	..
C. P. . . . .	756	0.1	944	0.1	886	0.1	1,114	0.1
Bombay . . . . .	1,571	0.1	6,547	0.6	1,935	0.2	7,899	0.8
Madras . . . . .	454	..	637	..	619	..	924	..
Coorg . . . . .	11	0.1	3	..	14	0.1	5	0.1
Assam . . . . .	..	..	..	..	..	..	..	..
Burma . . . . .	860	0.1	839	0.1	714	0.1	717	0.1
Ajmer-Merwara . . .	..	..	..	..	..	..	..	..

Total deaths and death rates p. m. in rural and urban areas in each province for the two years 1931 and 1932 are given in Table II (xvi).

TABLE II (xvi).

	Rural.				Urban.			
	1931.		1932.		1931.		1932.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
British India . . .	42,457	0.2	41,537	0.2	3,169	0.1	4,967	0.2
N.-W. F. P. . . .	1,040	0.1	1,871	0.1	110	..	132	..
Punjab . . . . .	..	..	..	..	1	..	..	..
Delhi . . . . .	..	..	..	..	..	..	..	..
U. P. . . . .	30,200	0.7	20,384	0.5	1,025	0.3	1,113	0.3
B. & O. . . . .	5,348	0.1	3,368	0.1	81	0.1	6	..
Bengal . . . . .	..	..	..	..	1	..	1	..
C. P. . . . .	1,436	0.1	1,662	0.1	206	0.1	393	0.2
Bombay . . . . .	2,932	0.2	12,938	0.7	574	0.1	1,508	0.3
Madras . . . . .	836	..	881	..	237	..	680	0.1
Coorg . . . . .	7	0.1	8	..	18	1.8	..	..
Assam . . . . .	..	..	..	..	..	..	..	..
Burma . . . . .	658	0.1	425	..	916	0.6	1,131	0.8
Ajmer-Merwara . . .	..	..	..	..	..	..	..	..

As usual, the maximum mortality was reported in March and the minimum in June. 29,886 deaths, or over 64% of the total, occurred between January and April. Of these, 19,257 or 65% were registered in the U. P. Between August and December a total of 12,968 deaths were recorded, of which 11,006 or 85% occurred in Bombay Presidency. Seasonal incidences for the different provinces are given in Appendix II.

Details of anti-rat measures and of plague researches will be found in subsequent paragraphs of this report.

In regard to his forecast of the probable plague incidence in India during 1932, Sir Leonard Rogers wrote :—

"It may be well to recall that high temperatures and saturation deficiencies, represented in the following table by + for moderate, and ++ for greater degrees, are unfavourable to high subsequent plague incidence, and *vice versa*. The data given in the Table show that the climatic conditions during 1931 up to October were on the whole distinctly unfavourable to high plague prevalence, in the areas dealt with, during the annual rise from the late rains in the Deccan and the C. P., and from November in North-Western India. I therefore anticipate low plague prevalence in India as a whole during the 1931-32 season."

The forecasts for each area are given in table II (xiv).

TABLE II (xiv).

Area.	Temperatures.		Saturation Deficiencies.			Forecast.
	Hot season.	S. W. monsoon.	First quarter.	Hot season.	S. W. monsoon.	
B. & O.	++	++	+	++	+	The 1932 plague incidence should be low.
U. P.	++	++	—	++	+—	1932 plague likely to be below the average.
Punjab	+		+—	++	—	1932 incidence above average.
C. P.	++	+—	++	++	—	1932 incidence below the average.
North Deccan	+—		+—	++	—	1932 incidence average to somewhat low.
South Deccan	+	+—	++	+—	+—	1932 plague somewhat low.

As Sir Leonard Rogers anticipated, a low incidence was recorded in B. & O. and the U. P., two provinces which usually have been heavily affected ever since plague spread over India. In the C. P. too, although a slight increase over 1931 was recorded, the figures were still below the average. In other respects, however, the forecast was not so accurate. In the Punjab, the recorded figure was about the average, and in the Deccan a fresh outburst of infection raised the incidence both in parts of Bombay Presidency and in Hyderabad State.

Death rates by sex for 1931 and 1932 are given in Table II (xv). These figures, though incomplete, demonstrate clearly the generally higher incidence among females. The fact that women find their chief occupation indoors probably explains the higher rates among them.

below that figure occurred in different provinces, it may be taken as indicating with some degree of accuracy the fatality rates associated with bubonic plague in this country.

TABLE II (xii).

	1928.		1929.		1930.		1931.		1932.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
British India	121,242	0.5	72,489	0.3	24,841	0.1	45,626	0.2	46,504	0.2
N.-W. F. P.	..	..	..	..	..	..	..	..	..	..
Punjab	8,282	0.4	2,053	0.1	554	..	1,150	..	2,003	0.1
Delhi	6	..	1	..	..	..	1	..	..	..
U. P.	80,943	1.8	37,678	0.8	10,860	0.2	31,225	0.6	21,497	0.4
B. & O.	7,627	0.2	8,266	0.2	4,105	0.1	5,429	0.1	3,374	0.1
Bengal	6	..	..	..	..	..	1	..	1	..
C. P.	3,770	0.3	2,808	0.2	871	0.1	1,642	0.1	2,058	0.1
Bombay	13,563	0.7	13,014	0.9	5,026	0.3	3,506	0.2	14,446	0.7
Madras	2,106	0.1	1,801	..	1,459	..	1,073	..	1,561	..
Coorg	..	..	1	..	3	..	25	0.1	8	..
Assam	..	..	..	..	..	..	..	..	..	..
Burma	4,933	0.5	1,867	0.2	1,932	0.2	1,574	0.1	1,556	0.1
Ajmer-Merwara	6	..	..	..	1	..	..	..	..	..

As the centre of intensity of infection during 1932 moved to Bombay Presidency and Hyderabad State, it was to be expected that the proportions in these areas of the total mortality would be considerably increased as compared with previous years. Bombay Presidency and the Bombay States, in fact, recorded nearly 53% of the total plague cases in India during 1932-33. Alongside the districts of Satara, Belgaum and Sholapur in Bombay Presidency, the neighbouring districts of Gulbarga and Osmanabad in Hyderabad State; and Shimoga and Chitaldroog districts of Mysore State were all severely infected. In Madras Presidency, the highest figures were recorded in the districts of Bellary, Coimbatore and Madura. It is in the Cumbum Valley area of the last district where researches into the problems associated with plague recrudescence have been in progress for the last 2 years.

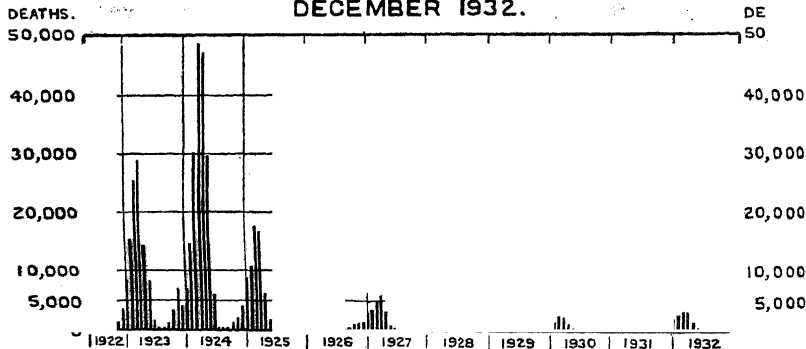
TABLE II (xiii).

	1930-31.		1931-32.		1932-33.	
	Cases.	% of total.	Cases.	% of total.		% of total.
<b>Total</b>	<b>44,091</b>	<b>100</b>	<b>52,867</b>	<b>100</b>	<b>59,234</b>	<b>100</b>
Punjab	1,702	3.9	3,077	5.8	2,485	4.0
Punjab States	13		..		36	
United Provinces	16,085	36.4	12,236	23.1	3,486	5.9
Bihar and Orissa	3,602	8.2	2,800	5.3	855	1.4
Central Provinces	6,367	14.4	15,552	29.0	3,067	5.2
Bombay Presidency	4,708		8,117	17.7	26,555	52.8
Bombay States	2,093	15.4	1,391		4,694	
Hyderabad State	3,128	7.1	867	1.6	8,422	14.2
Mysore State	2,872	6.5	3,992	7.5	4,285	7.2
Madras Presidency	1,607	3.6	2,288	4.3	3,694	6.2
Burma.	1,874	4.2	2,333	4.4	828	1.4

During 1932, the largest increases in incidence were recorded in the Deccan plateau and particularly in the Bombay Presidency, where the total deaths increased from 3,506 in 1931 to 14,446. Nearly 90% of this total occurred in the districts of Belgaum (4,719) with a death rate of 4.4 p. m.; Satara (3,646) or 3.1 p. m.; Dharwar (2,986) or 2.7; and Bijapur (2,136) or 2.5. The figures for the Punjab (2,003),—where the disease was mainly confined to the submontane areas,—for the C. P. (2,058) and for Madras Presidency (1,561) all were slightly higher than those of 1931; on the other hand, large decreases were reported from the U. P. (—9,728) and from B. & O. (—2,055). In the U. P. the districts of Saharanpur, Bijnor, Bareilly and Fyzabad were all severely infected; in B. & O., infection was practically confined to the districts of Muzaffarpur, Darbhanga and Saran lying north of the Ganges. The N.-W. F. P., Delhi, Bengal and Ajmer-Merwara remained entirely free, whilst in Coorg only sporadic cases occurred. Chart No. 8 gives figures from which a comparison may be made of the plague conditions in the provinces of Northern India during the last 3 years. Table II (xii) gives the numbers of deaths and rates *per mille* in British India and in individual provinces for the period 1928-32.

### NO 8

#### PLAGUE DEATHS REPORTED IN NORTHERN INDIA\*, BY FOUR-WEEK PERIODS, FROM JULY 1922 TO DECEMBER 1932.



\* North-West Frontier Province, Punjab and Punjab States, United Provinces and Bihar & Orissa.

NOTE.—Reproduced from the League's Weekly Epidemiological Record for week ending  
15th February 1933. (R.H.364)

As regards recorded cases of plague, details will be found in Table II (xiii) for British India and for the individual provinces. Comparison of these figures with those given in Table II (xii) below shows that the case mortality rate for British India as a whole was over 78 % and although variations above and



Nagore during the Kanduri and at Chidambarum during the Arudra Darsanam festival; as also at those festivals on the Cauvery river known to be endemic foci of infection. In this connection the D.P.H., says—

“How far the adoption of this measure has been responsible for such freedom from cholera it is impossible to gauge, because bacteriophage as an anti-cholera measure is still in its experimental stages.”

Phage was also used both as a prophylactic and for treatment of cases in the villages of Ganjam district.

Other preventive measures included disinfection, chlorination of water supplies, anti-cholera inoculation and the administration of bili-vaccine. A detailed report on the results obtained with bili-vaccine was submitted to the Madras government. Selected health inspectors were given training in inoculation and in the use of culture media, stocks of which were kept in the offices of the district and municipal health officers.

To ensure more prompt adoption of preventive measures, draft rules for combating cholera in rural areas were submitted to government.

*Assam.*—As in previous years, 5 mobile epidemic units each consisting of 3 sub-assistant surgeons and 6 disinfectant carriers were employed; 2 of these units worked in Sylhet district and 1 each in the districts of Goalpara, Kamrup and Nowgong; those in Nowgong and Habiganj were occupied with the experimental use of bacteriophage. In order to ensure as far as possible the prompt reporting of outbreaks, the rules published under government notification No. 459-M., dated the 28th February 1930 were being translated into Assamese and Bengali for wide circulation. Issues of cholera vaccine and bacteriophage totalled 169,317 c.c.s. and 191,618 doses respectively. In the Kamrup district which recorded a high mortality, preventive measures consisted of inoculation, closure of *bazars* and school, treatment with bacteriophage, distribution of leaflets, etc.

*Burma.*—Total inoculations numbered 37,809 in rural and 12,262 in urban areas. More than 80% of the total inoculations were done in the 3 districts of Akyah, Kyaukpyu and Meiktila, the figure for Akyah alone being 36,357.

## Plague.

### (a) General.

15. Examination of the figures for plague, over the period of years during which that disease has worked havoc in India, shows that the mortality in 1930 was the lowest on record, total deaths numbering 24,840 with a death rate of 0.1 p.m. This reduction was for the most part due to the fact that in nearly every instance the well known endemic foci recorded large decreases. During 1931, an upward trend in the mortality curve was recorded, total deaths numbering 45,626 and the death rate being 0.2 p.m. A further but minor increase occurred in 1932, when deaths totalled 46,504, but the reported cases for the first 6 months of 1933 indicate that the upward trend of 1931 and 1932 has been checked and that the 1933 total will be well below that for 1932 particularly in the most important foci of infection in Northern India which include the U. P. and B. & O.

the Muzaffarpur district, for instance, the average duration of an outbreak in a village was 2·8 days in 1931 and 1·9 days in 1932 as compared with 6 days in Champaran in 1931 and 5·6 days in 1932; 5·3 days in the Saran district in 1931 and 4·8 days in 1932. Although the adjoining and comparable districts of Saran, Champaran and Muzaffarpur presented a similar record in every respect before the use of bacteriophage, the Muzaffarpur district presented an entirely different picture in 1931 and 1932 as a result of the use of the phage by showing a considerable reduction in the duration of the epidemics which were mostly aborted. Having regard to the fact that the intensity and virulence of cholera differ from year to year, the value of bacteriophage can be proved definitely only by continued and prolonged use extending over several years, *i.e.*, until the occurrence of a severe epidemic when the value of bacteriophage can be finally demonstrated. The results obtained so far tend to prove that besides being cheap and easy of administration, bacteriophage is better for the prevention and treatment of cholera than the usual methods. The use of bacteriophage has accordingly been extended to Patna and Gaya districts in addition to Muzaffarpur and Purnea in 1933."

*Bengal.*—1,001,690 c.c.s. of anti-cholera vaccine were issued and over 950,000 inoculations were performed. This total included 150,473 inoculations in Midnapore district, 121,729 in Bakarganj, 102,082 in Noakhali, 77,208 in Tippera, 70,744 in 24-Parganas and 70,450 in Mymensingh; in other districts the totals varied between 300 in Chittagong Hill Tracts and 37,479 in Dacca.

Other preventive measures included disinfection of wells, tanks, etc.; propaganda; and inoculation of pilgrims proceeding to the Puri Rathjatra, the Ganga Sagar *mela* and the Haj.

*C. P.*—In Bhandara district, 3 epidemic dispensaries were detailed for inoculation work, disinfection of water supplies, health propaganda and treatment; a total of 16,129 inoculations were carried out. The cattle fair which was to be held in October at the village of Singhaji in Nimar district was stopped owing to the presence of infection in the neighbourhood.

In order to prevent importation of infection propaganda work and inoculations were carried out in connection with (i) Sinhasat fair at Nasik and Trimbak; (ii) Magh *mela*, Allahabad; and (iii) the Rath Jatra festival, Puri. In connection with these fairs, assistant medical officers were posted at important railway stations such as Nagpur, Jubbulpore, Itarsi and Khandwa. All assistant medical officers on epidemic duty were required to advise intending pilgrims to be inoculated, to carry out inoculations and to disinfect with permanganate all drinking water supplies *en route* to railway stations.

*Bombay.*—Although the disease was by no means widespread, the usual precautionary measures, such as distribution of potassium permanganate and cholera pills, the permanganating of water supplies, inoculation, etc., were all carried out with success. Four medical officers were detailed for inoculation work and 7,933 inoculations were performed in the Central Registration District, 7,155 in Sind; 4,609 in the Northern; and 2,016 in the Southern Registration District.

Although Government sanctioned a grant of Rs. 5,000 for anti-cholera measures, only Rs. 1,024 was spent. The grants for inoculation against plague, cholera and other epidemics which amounted to Rs. 25,000 included Rs. 8,351 for cholera and plague vaccines.

*Madras.*—As a departure from normal practice, bacteriophage was used at the important festivals of the Godavari Pushkaram, at Bhadrachalam during the Sri Rama Nawami, at Tiruvannamalai during the Krithigai festival, at

obtained the assistance of 3 epidemic doctors of the provincial public health cadre. The Rath Jatra festival gave no cause for alarm.

Eleven districts had their own health organisations which deal with outbreaks in their respective areas and government maintained a permanent epidemic staff of assistant surgeons. The provincial public health budget also included provision for an emergency staff of 100 epidemic vaccinators for employment in districts when required; and in bad cholera years additional temporary staff is also entertained. These emergency staffs are on demand detailed to districts but as far as possible district boards are expected to deal with epidemics with their own staffs. Government maintained with the civil surgeons reserve supplies of bleaching powder, permanganate of potash and kaolin which are issued to local bodies as required. Cholera vaccine which is stocked at the vaccine institute, Namkum, is also issued free on demand to civil surgeons and local boards; the issues totalled 241,235 doses. As a routine, inoculations are carried out at all important *melas* and specially during the car festival at Puri.

Encouraged by the results of field experiments in previous years, the use of bacteriophage was continued in the districts of Purnea and Muzaffarpur in North Bihar to the entire exclusion of inoculation and disinfectants. The results obtained are given in table II (xi) and confirm the previous findings. The figures include only cases treated within 48 hours of the onset of the disease.

TABLE II (xi).

	Total.			Treated with phage.			Not treated with phage.		
	Cases.	Deaths.	Percent- age of deaths.	Cases.	Deaths.	Percent- age of deaths.	Cases.	Deaths.	Percent- age of deaths.
<b>Muzaffarpur—</b>									
1931 . .	981	256	26.1	729	63	8.6	252	193	76.5
1932 . .	991	187	18.8	791	49	6.1	200	138	69.0
<b>Purnea—</b>									
1931 . .	698	424	60.7	250	53	21.2	407	349	85.7
1932 . .	348	184	52.8	201	69	29.8	147	124	84.2

The D. P. H. reports as follows :—

“In Muzaffarpur district 74.3% of cases of cholera were treated with phage in 1931 and 79.8% in 1932. The total mortality for treated and untreated cases in 1931 was 26.1% but whereas mortality in treated cases was only 8.6%, there was 76.5% of deaths in untreated cases. Similarly in 1932, the total mortality for treated and untreated cases was 18%. The mortality amongst treated cases was 6.1% and amongst untreated cases was 69%.”

“In the district of Purnea only 31.8% of the total number of cases of cholera were treated with bacteriophage in 1931. The total mortality from cholera was 60.8%, but the death rate amongst those treated with bacteriophage was 21.2. The death rate amongst the untreated cases was as high as 78.0. Similarly in 1932 only 57.7% of the total number of cases was treated with bacteriophage. The total mortality from cholera during this year was 58.2, but whereas the mortality amongst treated cases was 29.8%, in the untreated cases it was as high as 84.3%.”

“As regards the preventive value of bacteriophage it had the effect of cutting down the duration of an outbreak and the total deaths in each outbreak to a very marked extent. In

TABLE II (x).

	1930.	1931.	1932.
<b>Total</b>	<b>2,827,037</b>	<b>3,716,725</b>	<b>1,592,514</b>
N.-W. F. P.			
Punjab .	34,594	3,313	11,065
Delhi .	87,575	35,421	45,670
	3,466	624	
U. P. .			
B. & O.	105,266	130,880	54,730
Bengal .	731,000	666,510	241,235
	1,021,541	1,832,817	952,105
C. P. .			
Bombay	253,043	160,185	31,014
Madras .	134,097	310,031	21,713
Coorg .	237,597	431,287	76,859
		1,600	
Assam . .	145,498	119,975	108,052
Burma . .	40,052	20,751	50,071
Ajmer-Merwara	150	489	

*N.-W. F. P.*—Wells and springs in the infected areas were disinfected; inoculation and other preventive measures were carried out.

*Punjab.*—Despite favourable climatic conditions, the spread of infection was checked by inoculation and other preventive measures.

*Delhi.*—Suitable preventive measures were taken at the time of important fairs held either within the province or in adjoining districts. These included cleaning and permanganating of wells, inoculation, propaganda, provision of latrines and supervision of the sale of fruit and vegetables.

*U. P.*—23 districts in the divisions of Lucknow, Fyzabad, Benares, Kumaon and Gorakhpur were supplied with permanganate of potash and kaolin according to the prescribed scale; in other districts only actual requirements of the drugs were issued. The total issues were 25,635 lbs. of permanganate of potash, 2,499 lbs. of kaolin and 1,312 lbs. of essential oils mixture. Temporary regulations under the Epidemic Diseases Act were enforced in several districts. Reserve officers of the provincial health service, travelling dispensaries and other medical officers were detailed to the infected districts. Grants for anti-cholera measures made to District Magistrates and A. D. P. Hs. aggregated Rs. 7,012.

With a view to prevent the importation or spread of infection by pilgrims coming to or going from the Magh mela and other fairs, medical inspection of passengers was carried out at the railway stations of Moghul Sarai, Ballia, Gorakhpur, Bhatni and Saharanpur. Eight cases of plague, 8 of cholera and 28 of small-pox were intercepted and treated at the temporary infectious diseases hospitals established at those railway stations.

*B. & O.*—An outbreak in Balasore district following the Chandaneswar mela gave some cause of anxiety but was promptly controlled by the district board authorities who detailed medical personnel from unaffected areas and

occur in the delta of the Cauvery river and in the valley of the Tambaraparni, failed to develop and the decrease in cholera mortality as compared with the preceding 8 years was phenomenal. The infection of 1931 was carried over into the first quarter of the year in the districts of Ramnad, Madura, Coimbatore, Trichinopoly, South Arcot, Malabar and Tanjore but in the succeeding quarters the incidence declined steadily and, by the end of July, every district except Ganjam was practically free. The disease was imported into Ganjam from the Rathjatra festival at Puri and only towards the end of October did the infection disappear.

Only 25 of the 82 municipalities reported cases, a total of 262 deaths being recorded. The towns of Coimbatore, Palghat, Madura, Trichinopoly and Dindigul reported 142 deaths in all; other towns were almost entirely free.

*Assam.*—The death rate was lower than that for 1931 and was only half the decennial mean. Deaths were reported from 102 of the 147 registration circles and from 1,233 of the 28,333 villages. The seasonal peak occurred in May and the minimum in November. The districts of Kamrup (2.4) and Darrang (1.1) were worst affected. Of the total, 76 deaths were registered in urban and 4,895 in rural areas. The rural circle of Kamalpur in Kamrup district reported the highest death rate (5.9 p.m.); and other circles in this district also had high death rates.

In the Kamrup district, the disease assumed an epidemic form in the riverine areas on the north bank and the infection spread from Kamalpur along the Sessa and Puthimari rivers to the Hajo area. The water in these streams which were the sole sources of water supply of the villages along the banks was extremely low and practically stagnant. In Barpeta sub-division, the area chiefly affected was between the Mora Monas and the Pahumara rivers; here too the infection was traced to the streams. This outbreak was spread by villagers throwing cholera corpses and washing fouled clothes in the rivers.

The Sibsagar epidemic started with a small group of cases at Nazira on the bank of the Dikhu river. The infection was carried down the river infecting most of the villages, the worst sufferers being the fishermen. In the Darrang district infection was carried by the river Giladhor.

*Burma.*—The death rate was twice as high as in 1931 but was still well below the quinquennial mean. The districts of Akyab (907 deaths), Kyaukpyu (108) and Meiktila (39) suffered from epidemic outbreaks and reported 1,054 out of the total of 1,082 deaths for the whole province. Other areas were practically free or recorded only sporadic cases. Rural areas reported 1,033 deaths and urban areas 49. In Akyab, where the epidemic was most severe, infection was introduced by Chittagonian immigrants. In Kyaukpyu, the source of infection in one township was said to be infected water and in another township infection was imported from Akyab.

(c) *Anti-cholera measures.*

Table II (x) gives the numbers of anti-cholera inoculations performed in the different provinces.

The districts in Orissa were worst affected, Cuttack and Balasore each recording a death rate of 1.1 p.m. The districts of North Bihar and most of those in South Bihar suffered least. In Balasore district infection was introduced from the Chandaneswar *mela*. Of the towns, Lohardaga (1.9 p.m.), Kendrapara (1.6), Balasore (1.0) and Puri (1.0) reported high death rates.

*Bengal*.—The death rate fell by 56% as compared with 1931 and by 63% as compared with the quinquennial mean. The districts of 24-Parganas (1.6 p.m.), Khulna (1.5), Midnapur (1.2) and Howrah (1.1) were severely infected. Compared with the previous year, the death rate increased in 3 districts, decreased in 21 and was stationary in 3, but as compared with the decennial mean it diminished in every district except Midnapur. The urban death rate was less by 22% and the rural rate by 56% as compared with 1931. High urban rates were registered in Dhulia (2.4 p.m.), Patuakhali (2.3), Tamluk (2.0), Arambagh (2.0) and Bhola (2.0).

*C. P.*—Only 11 deaths were recorded in urban areas, but in rural areas the worst infected districts were Bhandara (582 deaths), Chanda (99), Nimar (72), Balaghat (30) and Bilaspur (29). In other districts only sporadic cases were recorded.

Eleven deaths occurred amongst inoculated persons in Bhandara district but these all took place within 10 days of inoculation. District reports indicate that infection was imported into Bilaspur district from Calcutta and Jagannath, Puri; into Bhandara from Nagpur district; but in Nimar the source of infection could not be traced.

*Bombay*.—Compared with 1931 and with the previous quinquennium the incidence was unusually low both in rural and urban areas. In the Presidency proper every district except Broach, Kaira, Panch Mahals, Ahmedabad and Ratnagiri were more or less affected; but epidemic outbreaks were chiefly confined to the districts of Thana (323 deaths), Nasik (288) and Kolaba (184) in the Central Registration District and East Khandesh (186) in the Northern Registration District. Sind reported only 15 deaths. Of the total, 1,215 deaths occurred in the latter half of the year, the epidemic reaching its height in November when 427 deaths were reported.

In the Central Registration District the incidence was high in Thana district and low in Bombay Suburban district. In Akola taluka in Ahmednagar district the infection was traced to the polluted water of the Pravara river. In Thana district the epidemic prevailed from October to December but was chiefly confined to Kalyan town. In this town and in Kolaba district the infection was imported. In the Northern Registration District the districts of Gujerat were practically free. As usual cholera first broke out in East Khandesh district, later spreading to West Khandesh district. In some talukas of these districts the infection was waterborne. In the Southern Registration District, Satara district, Walwa taluka, was chiefly infected, the source of infection being the water of the Krishna canal.

*Madras*.—The forecasts made in June and in October which both anticipated complete freedom from infection for periods of at least 3 months proved to be remarkably correct. Even the usual winter epidemics, which ordinarily

The urban death rate was higher than that in rural areas. Except in 1928, in fact, the incidence in rural areas has been remarkably low during the last decade. Table II (ix) gives comparative figures of cholera mortality in rural and urban areas for the years 1924 to 1932.

TABLE II (ix).

	Rural.			Urban.		
	Infected villages.	Deaths.	Average per village.	Infected towns.	Deaths.	Average per town.
1924 . . .	504	2,433	4.8	56	918	16.4
1925 . . .	585	2,475	4.2	49	574	11.7
1926 . . .	23	44	1.9	11	43	3.9
1927 . . .	1,283	9,856	7.7	76	1,430	18.8
1928 . . .	215	1,878	8.7	40	156	3.9
1929 . . .	407	1,529	3.8	66	780	11.8
1930 . . .	194	481	2.5	60	700	11.7
1931 . . .	97	193	2.0	28	198	7.1
1932 . . .	168	380	2.3	35	234	6.7

*Delhi.*—Only 6 seizures with 4 deaths were registered as against 67 cases and 61 deaths in 1931. No cases were reported from the rural areas.

*U. P.*—The number of recorded deaths was considerably less than in 1931 and the death rate fell from 1.3 p.m. in 1931 to 0.2, the lowest since 1927, the quinquennial mean being 0.9. The peak mortality occurred in September (3,243 deaths) and the minimum in February (17). Districts worst affected included Bareilly (1.3 p.m.), Hamirpur (0.8), Shahjahanpur (0.7) and Budaun (0.6); low rates were recorded in the districts of Agra, Unao, Muzaffarnagar, Mainpuri, Nainital, Gonda, Bahraich and Sultanpur; Almora and Jhansi were free or practically so. Gorakhpur district became infected by cases imported from Nepal and Bihar. Between July and November the disease occurred in 126 villages in the northern and eastern parts of this district and a total of 1,125 cases were recorded. In Jaunpur, infection was probably imported from Benares district in the last week of April and later in September from a Gaya pilgrimage but the disease on both occasions was quickly brought under control. In Bahraich district, the disease was imported in August from the Ajothia *Jhula* fair but only 26 deaths were registered in 7 villages. In Nainital, infection was introduced from Rampur State and from Bareilly but the outbreak was quickly stamped out.

Urban areas suffered more than the rural tracts. Of the 111 towns having a population of 10,000 or over, 50 were entirely free. Those recording the highest death rates included Budaun (3.6 p.m.), Atrauli (3.6), Etah (3.0) and Kasganj (1.8). The high rural death rates were registered in the districts of Bareilly (1.3), Hamirpur (0.8), Shahjahanpur (0.7) and Aligarh (0.6).

*B. & O.*—A further large decrease in incidence was recorded, the death rate being 5 times less than that of 1931 which also recorded a low incidence.

ably infected in Calcutta during March, April and June. In Calcutta, where the disease is rarely absent, an epidemic occurred during the months of April to July and a total of over 2,600 cases were recorded as against 2,239 in 1931. As regards other major ports, Madras had 9 cases, 2 of which were imported and Bombay had 12 cases; Chittagong reported 8 cases and Rangoon 7 cases. Karachi, Bassein, Moulmein, Negapatam, Cochin, Tuticorin, Vizagapatam and Aden remained free.

The question of the determination of a standard agglutinating serum for adoption in all laboratories as an index of virulence was considered at the October meeting of the Office International held at Paris and a standing commission consisting of 9 members, including the Public Health Commissioner with the Government of India, was formed to deal with the matter. India was one of the countries which were asked to assist. In regard to the identification of the cholera vibrio, the commission decided that the agglutination test was the best but it was proposed to combine this with the test for Pfeiffer's phenomenon by peritoneal inoculation. Although it was thought premature to admit the bacteriophage test as a method of diagnosis for the identification of a cholera vibrio, it was agreed that researches in regard to its identification by the action of a specific bacteriophage should be continued. The Office International has also asked all countries concerned to conduct systematic experiments on the sterilisation of healthy vibrio carriers by the method of inoculation "*per os*". Further details in regard to cholera researches now being conducted in India will be found in another section of this report.

(b) *Provincial.*

*N.-W. F. P.*—In August an outbreak occurred in Hazara district causing 86 cases with 70 deaths.

*Punjab.*—Generally a low incidence was recorded. The worst infected districts were Lahore (132 deaths), Gurdaspur (125), Ferozepore (58) and Ambala (45). In other districts recorded deaths varied from 1 to 38 only. Infection was imported into Karnal district from Hardwar (U. P.); into Ambala from Saharanpur district (U. P.) and Nahan state; into Rohtak from Bareilly (U. P.); into Lahore from Hardwar and Sitapur (U. P.); into Jullundur from Hardwar; and into Ferozepore from Faridkot and Bahawalpur states.

Table II (viii) gives figures for attacks and deaths from 1924 to 1932.

TABLE II (viii).

	Attacks.	Deaths.	Case mortality per cent.
1924 . . . .	4,118	3,351	81
1925 . . . .	5,961	3,049	51
1926 . . . .	139	87	62
1927 . . . .	13,557	11,286	83
1928 . . . .	3,070	2,034	66
1929 . . . .	4,510	2,309	51
1930 . . . .	2,040	1,181	58
1931 . . . .	706	391	55
1932 . . . .	1,119	614	55

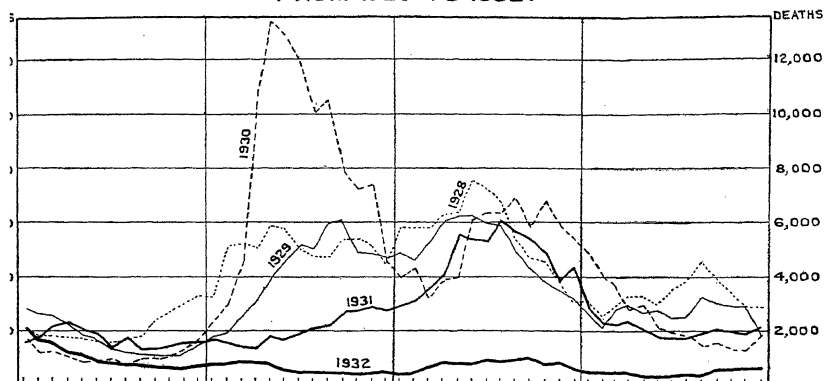


From Chart No. 6 the incidence of cholera mortality since 1877 in British India and in the various provinces can be studied. A brief examination of the chart shows that there has been on the whole a gradual but considerable reduction in cholera all over India since 1919 or 1920. This reduction is particularly noticeable in the U. P., Bombay, Assam and Madras but is also to be seen in the endemic provinces of Bengal and B. & O. although in these two areas, as might be expected, there have been years of high incidence. It is, in any case, fairly clear that since 1877, no decennial period has shown as low an incidence of cholera as that of 1923-32. It is only human to look for some explanation of such a striking phenomenon and although the *post hoc propter hoc* argument may here, as in other instances, be inapplicable, there are one or two features which do not seem to be entirely unassociated with the recorded reduction of this disease. The years from 1923, for example, synchronise with a period of gradual expansion of provincial public health departments and of better planned schemes for the prevention of the spread of cholera. During the same years, most pilgrimages, fairs and festivals, both large and small, have been brought under strict control by elaborate public health organisations; mention need only be made of the entire absence of infectious disease outbreaks at the most recent Kumbh *melas* at Allahabad and Hardwar, at the Thanesar fair in the Punjab, at the Sinhasht fair in Bombay and at the Godavari Pushkaram and Mahamakam festivals in Madras Presidency to indicate that health conditions in connection with these religious gatherings have entirely changed. Some would also claim that cholera bacteriophage which has been widely distributed in certain parts of India during recent years has played an important part in the prevention of epidemic cholera. These and other factors may have produced an effect; the fact remains that during the last 10-12 years cholera has not played the devastating part it frequently did in the past. Future experience alone will prove whether or not these new factors have had the effect which enthusiasts may even now feel inclined to claim on their behalf. Meantime no such claim is made here; the facts and figures are there and the reader is left to judge for himself as to their merits or demerits. As a last word, it may be added, that following the lull in 1932, some increase in cholera during 1933 has already been made apparent.

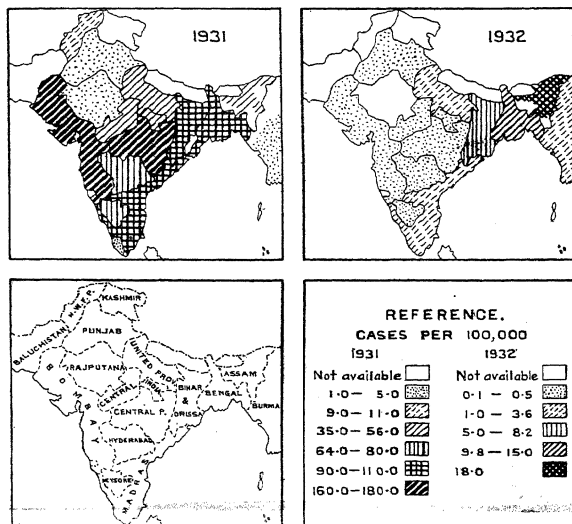
Although cholera in British India usually reaches its peak incidence between the months of June and September, during 1932 the maximum mortality occurred in January. This was due to the carry-over from the previous year of the severe outbreak in Bengal and to the usual seasonal wave of cholera during the months of December, January and February in Madras Presidency, as well as to the absence of the usual mid-year outbreaks. In Bengal, mortality was highest in January and at its lowest in October; the corresponding maximum and minimum being August and March in B. & O.; May and November in Assam; September and February in the U. P.; January and November in Madras Presidency; November and March in Bombay; and April and November in Burma. In the Punjab, 505 deaths or 82% of the total were recorded between July and September.

The Director, Eastern Bureau of the League of Nations, Singapore, reported that, during 1932, 30 ships were infected with cholera, 10 of these being in port at the time the infection was discovered. Of the above, 3 were presum-

# WEEKLY NUMBER OF DEATHS FROM CHOLERA IN INDIA FROM 1928 TO 1932.



## CHANGES IN THE GEOGRAPHICAL DISTRIBUTION OF CHOLERA IN INDIA DURING 1931 & 1932 (CASES REPORTED PER 100,000 INHABITANTS IN EACH PROVINCE.)



NOTE.-Based on data published in the League's Epidemiological reports for w/e  
15th November 1933 (R.H.403)

80% of the total were registered in Bengal, B. & O. and Bombay, whilst a large decrease was recorded in the U. P. and Burma; Punjab, Madras and the C. P. only had sporadic cases.

TABLE II (vi).

	1st.		2nd.		3rd.		4th.	
	(1931. 1932.)		(1931. 1932.)		(1931. 1932.)		(1931. 1932.)	
	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.
<b>Total</b>	<b>40,586</b>	<b>25,720</b>	<b>48,347</b>	<b>15,473</b>	<b>109,470</b>	<b>18,355</b>	<b>51,806</b>	<b>10,801</b>
N.-W. F. P. . . . .			241		3	88		
Kashmir . . . . .			74	118	507	924	126	19
Punjab . . . . .			4	59	35	55		
Punjab States . . . . .			56	41				
Delhi . . . . .			5,934	1,306	14,406		2,419	959
U. P. . . . .	216	210						
B. & O. . . . .	540	1,072	11,006	3,470	24,781		3,111	1,827
Bengal . . . . .	13,399	15,813	10,315	2,427	6,574	3,798	24,228	4,963
Bengal States . . . . .		9		8			29	
C. P. . . . .	17		173	92	21,107	1,241	6,170	477
C. I. Agency . . . . .	70	14	1,331	6	789	73	115	
Bombay . . . . .	2,201	275	7,264	55	24,015	640	5,123	1,602
Bombay States . . . . .	273		207	15	1,016		81	19
Hyderabad State . . . . .	233		935	53	6,153	5	2,030	26
Mysore State . . . . .	418		2,504	4	1,733		285	
Madras . . . . .	22,585		6,975	581	7,254	203	5,413	126
Burma . . . . .	595	1,059	1,057	1,745	534	827	2,571	479
Ajmer-Merwara . . . . .	17	769	225	531	130	144	68	19
Other Indian States . . . . .	22		156		356	454	57	285

Table II (vii) gives details for rural and urban areas with death rates for each province. In rural areas cholera deaths totalled 62,309 whilst those in urban areas were 4,910, the corresponding death rates being 0.3 p.m. and 0.2 as against 0.9 and 0.6 respectively in 1931. The rural and urban tracts in Bengal suffered almost equally severely but the rural mortality in Assam, Burma, Bombay, C. P. and B. & O. was greater than the urban. In the Punjab and the U. P. urban rates were high as compared with those in rural areas.

TABLE II (vii).

	Rural.		Urban.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.
<b>Total</b>		<b>0.3</b>	<b>4,910</b>	<b>0.2</b>
N.-W. F. P. . . . .			12	..
Punjab . . . . .	380		234	0.1
Delhi . . . . .	..		4	..
U. P. . . . .	8,633	0.2	1,101	0.3
B. & O. . . . .	9,093	0.3	255	0.2
Bengal . . . . .	31,511	0.7	2,399	0.7
C. P. . . . .	843	0.1	11	..
Bombay . . . . .	1,242	0.1	111	..
Madras . . . . .	4,621	0.1	657	0.1
Coorg . . . . .			..	..
Assam . . . . .	4,895	0.6	76	0.4
Burma . . . . .	1,033	0.1	49	..
Ajmer-Merwara . . . . .			1	..

Orissa had low cholera in 1930 but high incidence in 1929 and 1931, so average to low incidence is to be expected in 1932 if the winter rains do not fail.

Bihar had low cholera in 1931, as is usual after such an epidemic year as 1930. The good 1931 monsoon is likely to result in about average 1932 incidence.

The U. P. had normal monsoon and good October rains, average cholera incidence in 1931 and excess in the two previous years. Average to low incidence is likely in 1932.

The Punjab had low cholera in the last three years and good monsoon and October rain in 1931. The cholera incidence is likely to be about the average in 1932, but the South-West is liable to be invaded from Sind.

The N.-W. F. P. had low monsoon but good October rain, and cholera incidence was low in the last three years. Increased cholera is probable in 1932, especially in the southern districts bordering on Sind.

In Sind the 1931 monsoon rains failed almost completely, and the cholera rates were very low in 1930 and 1931, but epidemic in 1929 following failure of the rains in the first ten months of the year. In 1932 increased prevalence is likely; this will be liable to reach epidemic proportions if the rains are also short in 1932.

In Gujerat the 1931 monsoon rains were normal and cholera incidence has been low in the last three years. In 1932 about average incidence is likely, but probably higher than in 1931, especially if Sind suffers.

In the Bombay Deccan the 1931 monsoon rains were normal and cholera incidence was high in 1930 and 1931. Average to low cholera is likely in 1932.

In the Madras Deccan the 1931 monsoon rains were 25 per cent. in defect and the October rain was also short. The cholera incidence was in excess in 1930 and about the average in 1931. In 1932 the incidence is likely to be higher than in 1931, but not epidemic as in 1930.

South-East Madras received rather low monsoon and October rainfall, but that of November and December during the North-East monsoon is of more importance in this area; it is not yet known in London except for a cable report of floods in one area. Forecasts are particularly difficult in this area, as either short rain or floods may be followed by high cholera incidence, but about average incidence seems probable.

North-East Madras in 1931 had rather low monsoon but high October 1931 rainfall, and low recent cholera incidence. Some increase is likely in 1932.

The C. P. had over the average monsoon and October rain in 1931 and about average cholera incidence in 1931, but a high rate in 1930. Average to rather low incidence is indicated in 1932.<sup>11</sup>

Of the districts recording high mortality mention may be made of Kamrup (2.2 p.m.) and Darrang (1.1 p.m.) in Assam; 24-Parganas (1.6), Khulna (1.5), Midnapur (1.2), Howrah (1.1), Calcutta (1.0), Faridpur (1.0) and Bakarganj (1.0) in Bengal; Cuttack (1.1) and Balasore (1.1) in B. & O.; Akyab (1.4) in Burma; and Bareilly (1.3) in the U. P.

Table II (vi) gives the numbers of cases registered during each quarter in 1931 and 1932. Except in Bengal, Madras and Assam, the cholera position during the first half of 1932 was unprecedented and in the final quarter of the year, the whole of India, except for Bengal, experienced several months of comparative freedom from this endemic disease.

During the 1st quarter, the incidence in Bengal, B. & O. and Assam exceeded that of the corresponding period of 1931; the situation was however particularly favourable in Bombay Presidency, whilst in the C. P. and U. P. the incidence was very low and the N.-W. F. P., Punjab and Delhi were entirely free of the disease.

During the 2nd quarter, Assam recorded an incidence of 18.9 per 100,000 of the population; Bengal and B. & O. had rates of 5.0 and 15.0 per 100,000 respectively. In no other province did the rate exceed 3.6 per 100,000.

During the 3rd quarter, the provinces of U. P., B. & O. and Bengal recorded nearly 75% of the total cases; and during the last quarter of the year, nearly

## Cholera.

## (a) General.

14. During 1932 recorded deaths from cholera numbered 67,219. The first impression one receives is that this figure is of catastrophic magnitude, nevertheless it is the lowest recorded in India since registration of deaths was introduced and gives a death rate of only 0.2 p.m. The only other comparable annual figure is that for 1923 when cholera deaths numbered 73,002. As compared with the previous two years, every province showed a large decrease in incidence, although high mortality figures were still registered in the provinces of the U. P., B. & O., Bengal and Assam. Bengal, the endemic home of the disease suffered most severely, deaths numbering 33,910, or nearly 50% of the total and the death rate being 0.7 p.m. Assam had a death rate of 0.6, and nearly 10,000 deaths were recorded in each of the provinces of U. P. and B. & O. In the N.-W. F. P., in the Punjab, in Delhi and in the C. P. only mild outbreaks occurred whilst Coorg and Ajmer-Merwara were entirely free. Table II (v) gives the deaths and death rates for British India and the various provinces. Compared with 1931, only Burma and the Punjab recorded increased death rates and even there the increases were almost negligible.

TABLE II (v).

	1930.		1931.		1932.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
<b>Total</b>	<b>337,322</b>	<b>1.3</b>	<b>220,909</b>	<b>0.8</b>	<b>67,219</b>	<b>0.2</b>
N.-W. F. P.	449	0.2	105		70	..
Punjab	1,181	0.1	391		614	..
Delhi	8		61	0.1	4	..
U. P.	61,334	1.4	31,118	0.6	9,734	0.2
B. & O.	155,215	4.6	40,943	1.1	9,348	0.2
Bengal.	54,963	1.2	79,073	1.6	33,910	0.7
C. P.	23,250	1.7	14,135	0.9	854	
Bombay	15,142	0.8	18,646	1.6	1,353	
Madras	18,746	0.5	30,232	0.7	5,278	0.1
Coorg			116	0.7		
Assam	6,332	0.9	5,523	0.7	4,971	0.6
Burma	661	0.1	534	..	1,082	0.1
Ajmer-Merwara	41	0.1	32	0.1	1	

It is interesting to compare these figures and rates with the forecast of probable cholera incidence for 1932 made by Sir Leonard Rogers. His forecast runs as follows :—

“The incidence of cholera in India as a whole is not likely to exceed the average and will probably be well below it, unless the winter rains fail.

Assam has had low cholera for four years running, so some increase is likely, but epidemic prevalence is unlikely unless the winter rains fail.

Bengal has had low cholera for the last three years, especially in the eastern and northern division, so some increase is probable, chiefly in those areas, but not a serious epidemic in view of the good 1931 monsoon.

TABLE II (iii).

	N.W.F.P.	U. P.	B. & O.	Bengal.	C. P.	Bombay	Madras.	Coorg.	Assam.
Cholera . . .	xxx				xxx	xxx	xxx	xxx	xxx
Plague . . .					xxx	xxx	xxx	xxx	
Small-pox . . .					xxx	xxx	xxx	xxx	
Acute poliomyelitis . . .					xxx	xxx	xxx	xxx	
Anthrax . . .					xxx	xxx	xxx	xxx	
Cerebrospinal fever . . .					xxx	xxx	xxx	xxx	
Relapsing fever . . .					xxx	xxx	xxx	xxx	
Pneumonia . . .					xxx	xxx	xxx	xxx	
Encephalitis lethargica . . .					xxx	xxx	xxx	xxx	
Influenza . . .	x	x	x		xxx	xxx	xxx	xxx	
Diphtheria . . .	x	x	x		xxx	xxx	xxx	xxx	
Scarlet fever . . .	x	x	x		xxx	xxx	xxx	xxx	
; cough . . .	x				xxx	xxx	xxx	xxx	
Chickenpox . . .									
Glanders . . .									
Leprosy . . .									
Tuberculosis . . .	x	†x							x†
Enteric fever . . .	x	x							x
Erysipelas . . .	x								
Kala-azar . . .									x*
Puerperal fever . . .									
Beri-beri . . .									
Typhoid . . .									
Paratyphoid . . .									
Mumps . . .									
Dysentery . . .									
Sprue . . .									

\* In municipal towns only.

† Notifiable in municipalities by medical practitioners only.

TABLE II (iv).

Diseases.	Lucknow.	Nagpur.	Madras.	Vizagapatam
Cholera . . .				
Plague . . .	xxx	xxx	xxx	xxx
Small-pox . . .	xxx	xxx	xxx	xxx
Acute poliomyelitis . . .				
Anthrax . . .				
Cerebrospinal fever . . .	x	x	x	x
Relapsing fever . . .				
Pneumonia . . .				
Encephalitis lethargica . . .				
Influenza . . .	†x	x	x	x
Diphtheria . . .	x	x	x	x
Measles . . .				
Scarlet fever . . .				
oping cough . . .				
Chickenpox . . .				
Glanders . . .				
Leprosy . . .				
Tuberculosis . . .				
Enteric fever . . .				
Yellow fever . . .				
Puerperal fever . . .				
Beri-beri . . .				
Typhoid . . .				
Mumps . . .				
Dysentery . . .				
Sprue . . .				
Rabies . . .				

† Notifiable under Bengal Port Sanitary Regulations.

§ Acute Influenza.

## LE

	Cholera.				Small-pox.				Plague.			
	Deaths.		Rate p.m.		Deaths.		Rate p.m.		Deaths.		Rate p.m.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	36,481	31,788	0.3	0.2	23,070	21,855	0.2	0.2	20,281	28,273	0.1	0.2
N.-W. P.	39	31	..	..	263	247	2	0.2	..	..	..	..
Punjab	371	243	..	..	2,675	2,509	2	0.2	..	..	..	..
Dalh.	3	1	..	..	83	00	2	0.4	..	..	..	..
M. P.	5,232	4,602	0.2	0.2	1,409	1,370	..	..	9	..	..	..
B. & O.	4,880	4,628	0.3	0.2	3,485	79	0.4	0.4	1	..	..	..
Bengal	17,867	16,043	0.7	0.7	4,029	3,5	0.2	0.2	..	..	..	..
C. P.	404	450	..	..	301	273	..	..	..	..	..	..
Bombay	720	633	0.1	..	1,414	1,295	0.1	..	11	..	..	..
Madras	2,502	2,470	0.1	0.1	2,610	2,744	0.1	0.1	75	..	..	..
Coorg	..	..	..	..	1	..	..	..	63	..	..	..
Assam	2,612	2,359	0.6	0.6	344	201	0.1	0.1	..	..	..	..
Burma	610	472	0.1	0.1	1,385	999	0.2	0.2	..	..	..	..
Ajmer-Merwara	1	..	..	..	76	62	0.3	0.2	..	..	..	..

	Fever.				Dysentery and Diarrh.				Plague.			
	Deaths.		Rate p.m.		Deaths.		Rate p.m.		Deaths.		Rate p.m.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British India	1,811,649	1,644,496	13.1	12.6	15,979	106,825	0.8	0.8	177,701	..	1.6	1.4
N.W. P.	20,947	17,035	10.8	10.0	312	217	0.2	0.2	1,792	1,302	1.4	1.2
Punjab	205,665	182,862	15.7	16.8	7,095	6,192	0.5	0.6	33,244	27,007	2.5	2.5
Dalh.	3,600	3,705	9.6	13.6	267	242	0.7	0.9	2,085	1,920	5.1	5.8
U. P.	483,925	389,331	18.1	16.8	6,546	6	0.8	0.2	17,892	15,838	0.7	0.7
B. & O.	295,648	269,018	15.6	14.1	8,344	7	0.5	0.4	3,208	2,374	0.2	0.2
Bengal	351,990	339,538	13.5	14.1	30,746	16	0.8	0.8	33,140	23,11	1.5	1.0
C. P.	123,919	113,824	16.8	14.5	2,119	11.3	1.5	1.4	17,649	12,462	2.3	1.8
Bombay	69,872	66,379	8.6	9.1	1,853	10.7	1.0	1.0	53,468	42,418	4.4	4.0
Madras	147,430	143,016	6.5	6.2	11,180	39.2	1.8	1.7	50,770	42,418	2.2	1.9
Coorg	1,627	1,517	16.8	19.4	69	41	0.8	0.6	..	64	2.2	0.7
Assam	51,908	46,303	12.8	12.2	4,336	3,905	1.0	1.1	3,292	36	0.8	0.6
Burma	39,611	36,286	6.8	6.1	2,960	2,231	0.5	0.4	6,082	845	1.1	0.8
Ajmer-Merwara	5,717	5,217	19.2	19.7	162	147	0.5	0.6	621	621	2.3	2.3

TABLE II (i).

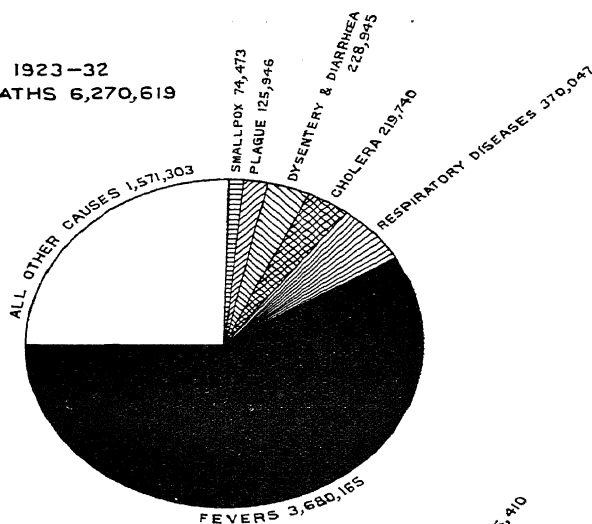
	Cholera.		Small-pox.		Plague.		Fever.		Dysentery and diarrhoea.		Respiratory diseases.		Other causes.		Total.	
	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.	Deaths.	Rate p.m.
British India . .	67,219	0.2	44,925	0.2	46,504	0.2	3,456,144	12.9	222,904	0.8	405,994	1.5	1,592,146	5.9	5,806,666	21.6
N.-W. F. P. . .	70	..	513	0.2	..	..	38,632	16.1	529	0.2	3,094	1.3	4,389	1.8	47,177	16.7
Punjab . . .	614	..	5,184	0.2	2,003	0.1	958,427	16.2	13,287	0.6	60,251	2.5	109,616	4.6	579,332	24.2
Delhi . . .	4	..	183	0.3	..	..	7,805	11.2	499	0.8	4,015	6.2	3,761	5.8	15,737	24.2
U. P. . . .	9,794	0.2	2,779	..	21,497	0.4	863,256	17.5	12,886	0.3	33,780	0.7	142,393	2.9	1,076,225	22.0
B. & O. . .	9,343	0.2	16,466	0.4	8,374	0.1	564,666	14.8	15,727	0.4	5,582	0.1	160,782	4.2	775,945	20.4
Benzal . . .	33,910	0.7	7,91	0.2	1	..	691,413	13.8	39,562	0.8	62,249	1.2	187,674	3.6	1,022,219	20.3
Q. P. . . .	854	..	574	..	2,058	0.1	237,743	15.1	23,493	1.5	30,411	2.0	121,844	7.8	416,677	26.5
Bombay . . .	1,353	..	2,699	0.1	14,446	0.7	195,250	8.8	22,610	1.0	66,524	4.2	172,562	7.8	502,474	22.7
Madras . . .	5,278	0.1	5,363	0.1	1,601	..	291,416	6.8	80,410	1.7	94,312	2.0	513,684	11.2	992,024	21.6
Coorg . . .	..	..	1	..	8	..	2,944	13.0	110	0.7	264	1.6	490	3.0	3,817	23.3
Assam . . .	4,971	0.6	631	0.1	..	..	98,311	12.2	8,241	1.3	5,358	0.7	32,909	4.1	150,321	18.7
Burma . . .	1,082	0.1	2,484	0.2	1,556	0.1	75,897	6.2	7,191	0.4	11,890	1.0	111,380	9.1	209,420	17.1
Ajmer-Merwara . .	1	..	198	0.2	..	..	10,094	10.4	309	0.5	1,304	2.3	1,202	2.2	13,948	24.7



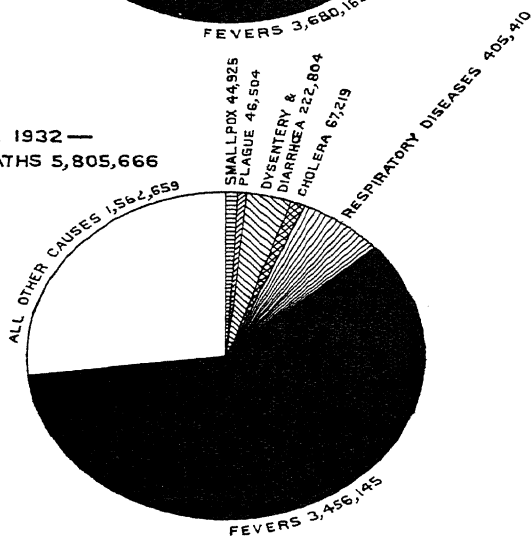


No 5  
BRITISH INDIA  
COMPARATIVE DIAGRAMS OF DEATHS BY CAUSES

MEAN 1923-32  
TOTAL DEATHS 6,270,619



YEAR 1932 —  
TOTAL DEATHS 5,805,666



## SECTION II.

## History of Chief Diseases.

## Chief Causes of Mortality.

13. Table II (i) and diagram No. 5 give total deaths and rates *p. m.* for the chief groups of diseases under which deaths are registered in British India. The "fevers" group was as usual the largest, nearly 59% of all deaths being classified under this heading with a recorded death rate of 12.9 *p. m.* 'Other causes' amounted to 27 % of the total with a death rate of 5.9 *p. m.*; only 7% were recorded as respiratory diseases, the death rate for this group being 1.5 *p. m.* The three great epidemic diseases, cholera, small-pox and plague, had each a death rate of 0.2 *p. m.*, a comparatively low figure as compared with the corresponding rates of previous years but still representing totals varying between 67,000 and 45,000.

Table II (ii) gives the male and female deaths and rates *per mille* of the more important registered groups of diseases for British India and for the various provinces.

In the report for 1930, it was stated that "owing to the want of knowledge on the part of those responsible for registration, a number of diseases in which fever is a marked symptom are grouped under the general heading "fevers", whilst the "other causes" group defies any attempt at analysis, although in various limited areas, certain efforts have been made which throw a modicum of light on the mysteries concealed by this omnibus term." This position still holds good; the only diseases for which registration can be said to have reached a fair standard of accuracy are cholera, smallpox and plague, these being the most common and most fatal of the epidemic diseases which periodically devastate India. The urban death rates for smallpox, dysentery and diarrhoea and respiratory diseases were higher than those of rural areas, whilst those for cholera and "fevers" were lower. Mortality rates for rural and urban areas in each province are given in Appendix II (pages 359-364).

The difficulty of making any detailed comparative analysis of the recorded deaths in different parts of India will be made plain by a study of Table II (iii) and Table II (iv) which indicate the diseases at present notifiable in the various provinces and in certain of the larger cities and towns. Since 1919, Public Health has been a "transferred subject" for which provincial Governments are primarily responsible but it would seem justifiable to demand more uniformity throughout India in respect of diseases made "notifiable." As things are at present the wide variations make it almost impossible to draw any comparison of value between the recorded figures for different areas.

## Abbreviations—

R.	.	.	.	Rural
U.	.	.	.	Urban.
N.-W. F. P.	.	.	.	North-West Frontier Province.
U. P.	.	.	.	United Provinces of Agra and Oudh
B. and O.	.	.	.	Bihar and Orissa.
C. P.	.	.	.	Central Provinces.
D. P. H.	.	.	.	Director of Public Health.
A. D. P. H.	.	.	.	Assistant Director of Public Health.

TABLE I (xxvi)—*contd.*

	Births and deaths verified.	Per cent omission.		
		Births.	Deaths.	Total.
<i>C. P.</i> —				
Revenue officers . . . . .	94,511	..	..	0.4
Police officers . . . . .	150,371	..	..	1.5
Civil surgeons, etc. . . . .	102,480	..	..	0.3
Vaccination staff . . . . .	1,286,047	..	..	0.3
Medical officers, etc. . . . .	447,273	..	..	..
D. P. H. . . . .	45,353	2.6	10.3	6.4
<i>Bombay Presidency</i> . . . . .	..	2,783	117	2,900
<i>Madras Presidency</i> —				
District health staff . . . . .	..	83,249	19,068	102,317*
<i>Assam</i> —				
Municipalities . . . . .	9,573	3.0	2.3	2.7
Rural areas . . . . .	81,787	5.9	3.5	..
<i>Burma</i> —				
Public health staff . . . . .	442,951	..	..	..
District officers . . . . .	83,685	..	..	..

\* Total detected.

## Indian States.

12. Only a few Indian States submit their vital statistics and these have been summarised in Table I (xxvii). Registration in these States is no more reliable than it is in British India.

TABLE I (xxvii).

	Population.			Births.			Birth rate p.m.	Total deaths.	Death rate p.m.
	M.	F.	Total.	M.	F.	Total.			
Jind . . . . .	176,883	148,203	324,676	6,465	5,691	12,156	37	6,234	19
Suket . . . . .	29,859	28,549	58,408	649	617	1,266	22	1,240	21
Kalsia . . . . .	33,306	26,542	59,848	1,073	914	1,987	32	1,466	25
Maler Kotla . . . . .	Not available			845	685	1,530	19	655	..
Baghat . . . . .	5,744	3,981	9,725	82	59	141	11	89	..
Jawhar . . . . .	29,502	27,759	57,261	1,292	1,144	2,436	43	1,251	..
Dhrol . . . . .	13,614	14,039	27,653	525	499	1,024	37	506	18
Kholapur . . . . .	476,105	453,153	929,258	17,732	16,344	34,076	37	24,774	27
Mysore . . . . .	3,284,554	3,138,635	6,423,189	58,778	56,849	115,627	18	88,175	14

*Mysore State.*—Birth rates in districts varied from 21 p.m. in Kolar to 11 p.m. in Hassan and death rates from 16 p.m. in Shimoga to 11 p.m. in Hassan. The death rate was highest in December and lowest in June. Infantile deaths numbered 11,026 giving a rate of 95 p.m. of live-births.

In the *Punjab*, 6,721 were male and 4,851 female still-births. In the *U. P.*, Gorakhpur district recorded 3,171, Sitapur 864 and Gonda 849, whilst in the districts of Jalaon, Etah and Sultanpur only small numbers were recorded and in Mainpuri district not a single case. In *Bengal*, the proportion of still-births to total births varied between 84 per 1,000 in Calcutta, 61 in Noakhali, 59 in Chittagong, 57 in Darjeeling, 54 in Bogra, 8 in 24-Parganas and 5 in Hooghly district. In the *C. P.*, Raipur district recorded 3,535, Bilaspur 2,931, Drug 2,250 and Yeotmal 1,284. In *Madras Presidency*, the figure for municipalities was 5,873 ; that for rural areas 15,826.

### Registration.

11. Bengal is the only province in which registration of births and deaths is compulsory in all urban and rural areas. In Madras Presidency, the Births and Deaths Registration Act (Act III of 1899) was further extended. In rural towns, registration still continues to be badly done, but the compilation of statistics for non-municipal areas was centralised in the office of the D.P.H. and improvement should occur. In B. & O., registration is compulsory in all the 58 municipalities but not in rural areas ; the police is the reporting agency throughout the province. In Burma, registration was in force in 32,478 villages and towns. In the Arakan Hill Tracts, Chin Hills and in some parts of Shan States, registration has to be carried out by means of tallies made of coloured sticks or notched bamboo splits, whilst illiterate registrars and poor means of communication increase the difficulties. In Assam, registration is compulsory in the towns, but not in rural areas. In the latter, *chowkidars* and *gaonbaras* carry out this work in addition to their other village duties.

Certain groups of recorded vital statistics, checked and verified by the respective health departments, are given in Table I (xxvi). The estimated percentages of error may be taken as mere approximations.

TABLE I (xxvi).

Agencies for verification.	Births and deaths verified.	Per cent omission.		
		Births.	Deaths.	Total.
<i>N.-W. F. P.</i> —				
Revenue staff . . .	25,277	0.3	0.3	0.3
Vaccination staff . . .	94,484	20.8	4.0	13.7
<i>U. P.</i> —				
District health staff . . .	263,583			4.7
Vaccination staff . . .	1,314,660	1.1	0.7	
Civil surgeons . . .	3,771	..	..	
A. D. P. Hs. . .	8,203	..	..	
Local Authorities, revenue staff and police.	99,765	3.0	2.5	
<i>B. &amp; O.</i> —				
Municipal health and vaccination staff.	28,099			1.9
Rural vaccination staff . . .	45,934			
<i>Bengal</i> —				
Vaccination staff . . .				

### Causes of Infantile Mortality.

9. Little need be added to the remarks made under this heading in last year's report. Statistics of causes of infantile mortality are not yet recorded in India but there is every reason to believe that the main causes are prematurity, infantile debility, bowel disorders, convulsions, malnutrition, diarrhoea and enteritis, respiratory diseases, inanition, smallpox, fevers and marasmus. In Section III, the part which unskilled aid must play has been made clear. In the same section will be found a brief description of the steps which have been and are being taken in municipal and rural areas to eliminate the risks attached to the use of unskilled service. As before, Table I (xxiv), which gives figures for the chief causes of infantile mortality in Bombay city, is reproduced from the annual report of the Health Officer.

TABLE I (xxiv).

	Number of infant deaths during					Mean 1928-32.
	1928.	1929.	1930.	1931.	1932.	
All causes . . . . .	7,468	7,225	7,506	7,401	6,298	7,180
Smallpox . . . . .	127	240	449	2	69	177
Measles . . . . .	23	37	41	15	16	26
Malaria . . . . .	13	18	13	5	4	11
Remittent and undefined fever . .	143	169	203	198	147	172
Diarrhoea and enteritis . . . .	268	303	350	366	280	313
Dysentery . . . . .	28	23	39	34	27	30
Debility, malformation and pre-mature birth.	3,105	2,779	2,791	2,987	2,685	2,869
Respiratory diseases . . . . .	2,630	2,523	2,529	2,646	2,217	2,509
Convulsions . . . . .	654	662	626	620	422	597
Other causes . . . . .	477	471	425	528	431	466

### Still-births.

10. Table I (xxv) gives the numbers of recorded still-births in the different provinces; these figures are almost certainly incomplete.

TABLE I (xxv).

	Number.	Rate p.m. live-births.
<b>British India . . . . .</b>	<b>175,857</b>	<b>19</b>
N.-W. E. P. . . . .	230	3
Punjab . . . . .	11,572	12
Delhi . . . . .	348	12
U. P. . . . .	13,725	8
B. & O. . . . .	40,729	32
Bengal . . . . .	46,742	34
C. P. . . . .	16,185	23
Bombay . . . . .	11,950	15
Madras . . . . .		13
Coorg . . . . .		
Assam . . . . .	8,851	37
Burma . . . . .	3,782	11
Ajmer-Merwara . . . . .	44	2

*N.-W. F. P.*—The death rate among Hindus was 125, Muhammedans 130, Indian Christians 156 and other classes 333.

<i>Delhi.</i> —	Rural.		Urban.		Total.		
	Male.	Female.	Male.	Female.	Male.	Female.	Total.
Hindus . . .	203	196	212	200	207	198	203
Muhammedans .	209	221	163	155	171	166	168
Christians . .	279	308	96	156	138	182	157

Provincial rural and urban infantile death rates, where available, are given in Table I (xxii) in accordance with one of the recommendations of the Royal Commission on Agriculture. Except in the provinces of Madras, Assam and Delhi, urban rates were higher than those of rural areas.

TABLE I (xxii).

	Rural.		Urban.	
	Deaths.	Rate p.m. live-births.	Deaths.	Rate p.m. live-births.
<b>British India</b>	<b>1,355,613</b>	<b>167</b>	<b>171,819</b>	<b>189</b>
N.-W. F. P. . . . .	7,449	125	1,365	160
Punjab . . . . .	149,509	175	23,695	203
Delhi . . . . .	1,931	203	3,426	185
U. P. . . . .	232,643	155	40,419	232
B. & O. . . . .	159,319	128	4,593	148
Bengal . . . . .	224,659	179	12,934	184
C. P. . . . .	125,141	201	15,821	205
Bombay . . . . .	94,177	145	28,261	211
Madras . . . . .	271,144	193	26,615	119
Coorg . . . . .	935	237	35	37
Assam . . . . .	36,582	157	734	130
Burma . . . . .	50,025	171	11,947	272
Ajmer-Merwara . . . . .	2,099	156	1,974	316

A list of towns recording high infantile death rates will be found in appendix I on pages 354-356; recorded rates for 1932 and 1931 in Presidency and provincial headquarter towns are given in Table I (xxiii).

TABLE I (xxiii).

	1932.	1931.		1932.	1931.
Bombay . . . . .	219	274	Lucknow . . . . .	266	280
Calcutta . . . . .	246	244	Delhi . . . . .	201	202
Madras . . . . .	239	261	Lahore . . . . .	228	185
			Peshawar . . . . .	190.	182
Rangoon . . . . .	366	278			
Nagpur . . . . .	244	323			
Allahabad . . . . .	222	256			

C. P. (-60), U. P. (-16), B. & O. (-15), Burma (-12), Bombay (-5) and Madras (-4) recorded decreases ; other provinces recorded increases which were most noticeable in Ajmer-Merwarā and Coorg.

The infantile death rate for males was 177 and for females 160 as against 187 and 170 in 1931.

*U. P.*—Infant mortality was highest in September and lowest in March. The districts of Nainital (227), Lucknow (218), Farrukhabad (209) and Saharanpur (204) recorded the highest death rates ; the main causes were said to be malaria, enteric and other fevers, pneumonia and other respiratory diseases, tetanus, convulsions, exhaustion, malnutrition and premature birth. The lowest rates were recorded in the districts of Gorakhpur (104), Rae Bareilly (105), Ballia (110) and Almora (116). In municipalities employing M. O. Hs. 1,802 infant deaths were recorded from tetanus but verification of 1,168 of these revealed the fact that only 852 were due to this cause.

*Bengal.*—High mortality was recorded in the districts of Rangpur, 258 per 1,000 live-births, Rajshahi 235 and Nadia 215 and in Calcutta town 246. The male death rate exceeded the female in every district, except Rajshahi and Rangpur. The urban death rate was 2·7 per cent. higher than the rural varying between 448·5 per 1,000 live-births in Kalna Municipality, 312·4 in Birnagar and 14·8 in Jessore.

*C. P.*—Infant mortality was the lowest on record, this being ascribed to the comparative healthiness of the year. The rates were highest in September and lowest in March. The districts of Drug (230), Hoshangabad (225) and Jubbulpore (224) recorded the highest rates and Betul district (162) the lowest.

*Bombay Presidency.*—The death rate was the lowest recorded since 1915. The highest rural death rate was in Broach district (229) and the lowest in Ratnagiri district (85).

*Burma.*—The highest rural death rates were registered in Sandoway (257), Kyaukse (245) and Prome (240) ; the lowest in the districts of Mergui (91), Tavoy (91) and Myaungmya (94). In Assam, the recorded infantile mortality is gradually and steadily diminishing. Immaturity, ignorance of mothers, improper feeding, malaria, smallpox, measles, bowel diseases and tetanus were said to be the chief causes of death.

Infantile mortality rates by classes are not registered in British India except in the Punjab, N.-W. F. P. and Delhi. The available figures are interesting.

*Punjab.*—

	1932.		1931.	
	Male.	Female.	Male.	Female.
Hindus . . .	228	208	236	212
Muhammedans . .	205	173	237	181
Christians . .	172	134	156	120
Other classes . .	59	42	58	37



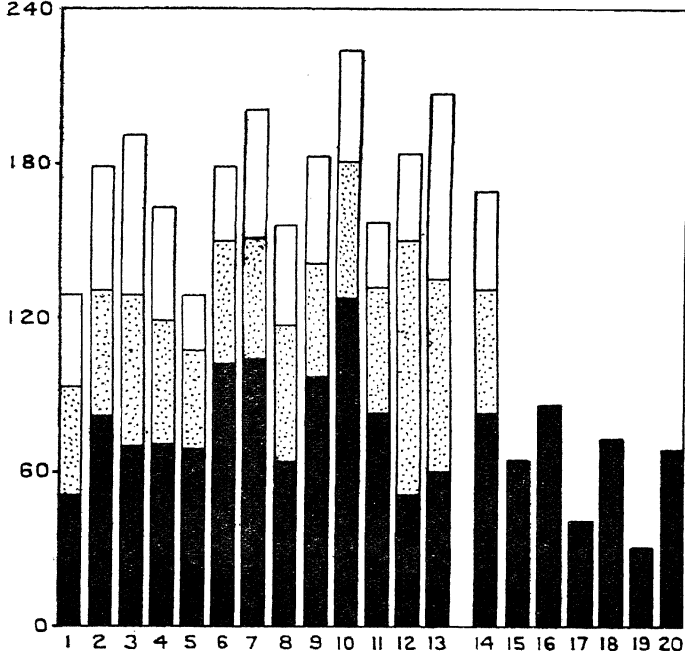


No 4

# INFANTILE MORTALITY PER MILLE OF BIRTHS IN BRITISH INDIA, ENGLAND AND WALES AND BRITISH DOMINIONS IN 1932

RATE P.M.

240



INDEX.

Under one month.....  
One to six months.....  
Six to twelve months.....

TOTAL INFANTILE  
MORTALITY RATES.

- |            |           |                   |
|------------|-----------|-------------------|
| 1 N.W.F.P. | 6 Bengal  | 11 Assam.         |
| 2 Punjab.  | 7 C.P.    | 12 Burma.         |
| 3 Delhi.   | 8 Bombay. | 13 Ajmer-Marwara. |
| 4 U.P.     | 9 Madras. | 14 British India. |
| 5 B. & O.  | 10 Coorg. |                   |

- |                          |
|--------------------------|
| 15 England & Wales.      |
| 16 Scotland.             |
| 17 Australia.            |
| 18 Canada.               |
| 19 New Zealand.          |
| 20 Union of S.A.(white). |

Assam, 23 in Bombay, 21 in N.-W. F. P., 21 in Delhi, 17 in Ajmer-Merwara and 15 in Burma.

Of every 100 infants dying in the first month of life, 60 died in the first week. Provincial figures ranged between 74 in Coorg, 71 in B. & O., 69 in Madras and 45 in Assam.

Of every 1,000 live-births, 50 infants died during the first week of life; the figure for Coorg was 96, for Madras 67, C. P. 62, Bengal 50, B. & O. 49, N.-W. F. P. 28 and Burma 27.

Of the total infant deaths, 49% occurred during the first month, the death rate being approximately 83 per 1,000 live-births during the first month, 48 between the second and the sixth month and 38 between the sixth and twelfth month. Tables I (xx) and I (xxi) give fuller details.

TABLE I (xx).

	Under one month.		One to six months.		Six to twelve months.		Total under one year.	Death rate per 1,000 live-births.	
	Number.	% of total.	Number.	% of total.	Number.	% of total.		1932.	1931.
<b>British India</b>	747,512	49	435,893	29	344,027	23	1,527,432	169	179
N.-W. F. P.	8,465	39	2,856	32	2,493	28	8,814	129	128
Punjab	79,629	46	47,301	27	46,274	27	173,204	179	178
Delhi	1,947	36	1,666	31	1,744	33	5,357	191	186
U. P.	119,529	44	79,940	29	73,598	27	273,062	163	179
B. & O.	87,513	53	48,580	30	27,319	17	163,912	129	144
Bengal	136,732	57	63,530	27	38,281	16	237,593	179	174
C. P.	73,124	52	33,057	24	34,781	25	140,962	201	261
Bombay	50,225	41	41,378	34	30,835	25	122,438	156	162
Madras	157,788	53	70,882	24	69,089	23	297,759	183	187
Coorg	554	57	229	24	187	19	970	224	200
Assam	19,774	53	11,570	31	5,972	16	37,316	157	153
Burma	17,007	28	33,422	54	11,543	19	61,972	185	197
Ajmer-Merwara	1,175	29	1,482	36	1,416	35	4,073	207	182

TABLE I (xxi).

				Percentage of			
				Deaths under one week.	Rate p.m. live- births.	deaths under one month.	total infant deaths.
<b>British India</b>	.	.	.	<b>449,530</b>	<b>50</b>	<b>60</b>	<b>29</b>
N.-W. F. P.	.	.	.	1,879	28	54	21
Punjab	.	.	.	44,493	46	56	26
Delhi	.	.	.	1,102	39	57	21
U. P.	.	.	.	74,259	44	62	27
B. & O.	.	.	.	61,783	49	71	38
Bengal	.	.	.	65,912	50	49	28
C. P.	.	.	.	43,740	62	60	31
Bombay	.	.	.	28,373	36	57	23
Madras	.	.	.	108,971	67	69	37
Coorg	.	.	.	413	96	75	42
Assam	.	.	.	8,841	37	45	24
Burma	.	.	.	9,074	27	53	15
Ajmer-Merwara	.	.	.	690	35	59	17

TABLE I (xviii).

	Quinquennial.		Annual.				
	1921-25.	1926-30.	1928.	1929.	1930.	1931.	1932
<b>British India</b>	<b>182</b>	<b>178</b>	<b>173</b>	<b>178</b>	<b>181</b>	<b>179</b>	<b>169</b>
England and Wales	76	68	65	74	60	66	65
Scotland	92	85	86	87	83	82	86
Austria	136	117	120	113	106	103	..
Belgium	100	95	87	104	93	82	..
Czechoslovakia	155	148	146	143	137	134	..
Denmark	82	83	81	83	80	81	..
Finland	96	88	84	98	75	75	..
France	95	89	91	95	78	76	76
Germany	122	94	89	96	84	83	79
Hungary	187	173	177	179	152	162	186
Italy	126	123	120	125	106	..	..
Netherlands	64	56	52	59	51	50	46
Norway	52	51	49	55	46	..	..
Portugal	145	146	..	151	144	146	..
Roumania	..	196	184	197	176	..	..
Spain	143	124	126	123	117	116	111
Sweden	60	59	59	59	55	57	..
Switzerland	65	54	54	52	51	49	..
Australia	58	52	53	51	47	44	41
Canada	98	93	90	92	89	85	73
New Zealand	43	37	36	34	34	32	31
South Africa (white)	73	67	71	64	67	65	69
United States of America	74	68	60	68	65	62	58
Japan	159	137	138	142	124	132	..
Egypt	144	152	151	159	151	160	..

Table I (xix) gives infantile death rates for British India and for England and Wales since 1912.

TABLE I (xix).

	British India.	England and Wales.		British India.	England and Wales.
1912	208	95	1924	189	75
1913	195	108	1925	174	75
1914	212	105	1926	189	70
1915	202	110	1927	167	70
1916	202	91	1928	173	65
1917	205	96	1929	178	74
1918	267	97	1930	181	60
1919	224	89	1931	179	66
1920	195	80	1932	169	65
1921	198	83			
1922	175	77			
1923	176	69			

In British India, of every 100 infants who failed to survive the first year of life, 29 died in the first week. In Coorg, 43 died in the first week, 38 in B. & O., 37 in Madras, 31 in C. P., 28 in Bengal, 27 in U. P., 26 in the Punjab, 24 in

TABLE I (xvi)—*contd.*

	Quinquennial.		Annual.				
	1921-25.	1926-30.	1928.	1929.	1930.	1931.	1932
Hungary . . . .	19.9	17.0	17.2	17.8	15.5	16.6	17.8
Italy . . . . .	17.3	16.0	16.1	16.5	14.0	14.8	14.6
Netherlands . . .	10.4	9.9	9.6	10.7	9.1	9.6	9.0
Norway . . . . .	12.5	11.0	10.9	11.5	10.4	10.7	..
Portugal . . . .	20.6	18.8	19.1	18.1	17.6	17.2	17.1
Roumania . . . .	23.0	21.2	20.2	21.4	19.4	20.8	..
Spain . . . . .	20.2	17.9	18.0	17.5	16.8	17.3	16.3
Sweden . . . . .	12.1	12.1	12.0	12.2	11.7	12.5	..
Switzerland . . .	12.5	12.1	12.0	12.5	11.6	12.1	12.1
Australia . . . .	9.5	9.3	9.5	9.6	8.6	8.7	8.7
Canada . . . . .	11.2	11.1	11.1	11.3	10.7	10.1	9.9
New Zealand . . .	8.6	8.6	8.5	8.8	8.6	8.3	8.0
South Africa (white)	9.7	9.7	10.2	9.5	9.7	9.5	9.9
United States of America	12.8	12.0	12.1	11.9	11.3	11.1	10.8
Japan . . . . .	21.8	19.5	19.8	19.8	18.2	19.0	..
Egypt . . . . .	17.6	17.6	17.3	16.7	25.0	26.8	..

The death rate for the age-period 15-40 years is usually higher among females than among males. Table I (xvii) gives provincial male and female death rates p.m.

TABLE I (xvii).

	Death rate 15-40 years.	
	Male.	Female
<b>British India.</b>	<b>10</b>	<b>11</b>
N.-W. F. P.	11	12
Punjab .	10	12
Delhi .	6	13
U. P. .	10	11
B. & O.	11	10
	11	13
C. P. .	9	10
Bombay	8	11
Madras .	8	9
Coorg ,	15	19
Burma . . . . .	10	13
Ajmer-Merwara	9	9
	8	12

### Infantile Mortality.

8. 1,527,432 deaths or 26% of the total mortality occurred during the first year of life, against 1,633,476 or 25% in 1931. In England and Wales the corresponding figures for 1931 and 1932 were 9% and 8% respectively. Compared with 1931 the rate of 168.7 for British India was lower by 10 p.m. For purposes of comparison the figures for British India are given in Table I (xviii) along with corresponding rates recorded in some other countries.

Of the total deaths, 1,527,432 or nearly 26% occurred among infants under one year of age ; 1,010,427 or 17% among children between the ages of 1-5 years ; and 300,048 or 5% among those between 5-10 years. In other words, of every 100 deaths recorded, 43 were children below 5 years of age and 48 those below 10 years. Infant and child mortality rates per cent. of total deaths are given in Table I (xv) for British India and for the provinces.

TABLE I (xv).

	Under one year.	1-5 years.	Total under 5 years.	5-10 years.	Total under 10 years.
<b>British India . . . . .</b>	<b>26</b>	<b>17</b>	<b>44</b>	<b>5</b>	
N.-W. F. P . . . . .	19	17	35	7	43
Punjab . . . . .	30	15	45	5	50
Delhi . . . . .	34	19	53	4	57
U. P. . . . .	25	20	45		
B. & O. . . . .	21	21	42		48
Bengal . . . . .	23	14	37		44
C. P. . . . .	34	21	54	4	59
Bombay . . . . .	24	22	46	5	51
Madras . . . . .	30	15	45	4	50
Coorg . . . . .	25	10	35	5	39
Assam . . . . .	25	15	40	8	47
Burma . . . . .	30	12	42	5	46
Ajmer-Merwara . . . . .	29	20	50	2	53

Deaths by months for the different provinces and those for rural and urban areas are given on pages 347-349 of Appendix I.

For purposes of comparison, the death rates in British India and those of a number of countries are given in Table I (xvi).

TABLE I (xvi).

	Quinquennial.		Annual.				
	1921-25.	1926-30.	1928.	1929.	1930.	1931.	1932
<b>British India . . . . .</b>	<b>27.5</b>	<b>26.0</b>	<b>25.6</b>	<b>25.9</b>	<b>26.8</b>	<b>24.9</b>	<b>21.6</b>
England and Wales . . . . .	12.2	12.1	11.7	13.4	11.4	12.3	12.0
Scotland . . . . .	..	..	..	..	..	13.3	13.5
Austria . . . . .	15.8	14.4	14.4	14.5	13.5	14.0	..
Belgium . . . . .	13.4	13.7	13.2	15.0	13.3	13.2	..
Czechoslovakia . . . . .	16.1	15.3	15.1	15.5	14.1	14.4	..
Denmark . . . . .	11.3	11.1	11.0	11.2	10.8	11.4	..
Finland . . . . .	15.2	15.0	14.6	16.2	14.3	14.1	..
France . . . . .	17.2	16.7	16.4	17.9	15.6	16.3	15.8
Germany . . . . .	13.3	11.8	11.6	12.6	11.1	11.2	..

## Deaths.

7. *British India*.—Registered deaths numbered 5,805,666 (males 3,039,159 and females 2,766,507) as compared with 6,615,099 in 1931.

The death rate was 21·6 p.m. as against 24·9 in 1931. The rate for females exceeded that for males in Delhi (+7 p.m.), Coorg (+2), Punjab (+1), Bombay (+1), Bengal (+1) and in Assam and Ajmer-Merwara it was nearly the same. Table I (xiii) gives registered numbers and rates *per mille* according to sex for British India and the various provinces.

TABLE I (xiii).

	Deaths.			Rate p.m.				Mean (1927-31).		
	M.	F.	Total.	M.	F.	Total.		M.	F.	Total.
						1932.	1931.			
British India	3,039,159	2,766,507	5,805,666	22	21	22	25	26	25	26
N.-W. F. P.	25,991	21,186	47,177	20	19	20	20	20	19	20
Punjab	308,259	271,123	579,382	24	25	24	26	24	25	25
Delhi	8,021	7,716	15,737	21	23	24	24	26	33	30
U. P.	581,125	495,100	1,076,225	23	21	22	27	25	25	25
B. & O.	408,484	389,461	777,945	21	19	20	26	26	24	25
Bengal	527,968	494,251	1,022,219	20	21	20	22	22	23	23
C. P.	219,378	197,599	416,977	23	25	27	35	36	35	34
Bombay	269,873	242,301	502,474	22	23	23	24	27	28	27
Madras	504,521	487,508	992,024	22	21	22	24	26	24	25
Coorg	2,037	1,780	3,817	22	24	23	24	26	28	27
Assam	78,593	71,723	150,321	19	19	19	19	19	19	19
Burma	109,573	99,347	209,420	18	17	17	17	21	20	20
Ajmer-Merwara	7,336	6,812	13,948	25	25	25	30	25	25	25

Rural areas recorded 5,171,533 deaths and urban areas 634,133, as against 5,950,020 and 655,079 in 1931, the corresponding rates being 21 p.m. and 24 p.m. The highest rural rates were recorded in the C. P., Delhi, Punjab and Bombay and the highest urban in Coorg, Ajmer-Merwara, U. P., Burma and C. P. In N.-W. F. P., Punjab, Delhi, B. & O., Bengal and Assam, the rural rate exceeded the urban; whilst in the U. P., Bombay, Madras, Coorg, Burma and Ajmer-Merwara it was less. Table I (xiv) gives the recorded totals and rates *per mille* in rural and urban areas in British India and in the provinces.

TABLE I (xiv).

	Deaths.			Death rate p.m. estimated population.			Mean death rate p.m., 1927-31.		
	R.	U.	Total.	R.	U.	T.	R.	U.	T.
British India	5,171,533	634,133	5,805,666	21·5		21·6		26	26
N.-W. F. P.	41,597	5,610	47,177	20	18	20	23	17	20
Punjab	506,740	89,642	579,382	25	25	24	25	20	25
Delhi	5,265	10,472	15,737	26	23	24	27	31	30
U. P.	958,397	117,828	1,076,225	21	21	22	24	39	25
B. & O.	757,470	18,475	775,945	21	13	20	25	16	25
Bengal		88,991	1,022,219	21	18	20	23	21	23
C. P.	372,144	44,833	416,977	27	27	27	34	35	34
Bombay	401,991	100,483	502,474	22	24	23	27	28	27
Madras	889,265	152,759	992,024	21	25	22	25	28	25
Coorg	3,396	421	3,817	22	43	23	26	52	27
Assam	146,981	3,340	150,321	19	17	19	19	17	19
Burma	168,776	40,644	209,420	18	29	17	18	35	20
Ajmer-Merwara	8,318	5,636	13,948	22		25		Not available	26

TABLE I (xi).

	1st. quarter.	2nd. quarter.	3rd. quarter.	4th. quarter.
<b>British India</b>	<b>2,055,138</b>	<b>1,889,581</b>	<b>2,378,658</b>	<b>2,731,129</b>
N.-W. F. P.	17,749	15,845	16,878	17,674
Punjab .	246,233	179,712	251,687	292,604
Delhi .	5,798	4,742	8,227	9,284
U. P.	391,363	303,587	442,256	540,866
B. & O.	278,129	255,304	352,104	386,759
Bengal	352,451	279,506	262,373	434,004
C. P. .	137,108	150,530	199,902	213,332
Bombay	169,202	180,439	215,214	218,062
Madras	313,562	394,566	480,016	439,237
Coorg	1,187	1,105	1,152	878
Assam	65,089	43,590	52,530	77,110
Burma	72,790	76,848	90,965	95,283
Ajmer-Merwara	4,477	3,807	5,354	6,036

Table I (xii) gives the proportion of male to female births for provinces and for British India as a whole.

TABLE I (xii).

	Males born per 1,000 females.		
	1932.	1931.	1927-31.
<b>British India .</b>	<b>108</b>	<b>108</b>	<b>108</b>
N.-W. F. P. .	130	130	130
Punjab .	112	111	112
Delhi .	108	111	109
U. P. .	112	112	112
B. & O. .	105	104	104
Bengal .	108	108	108
C. P. .	105	104	105
Bombay .	108	108	108
Madras .	105	105	104
Coorg .	109	104	107
Assam .	106	107	107
Burma .	104	105	105
Ajmer-Merwara	113	115	119

Births exceeded deaths by 635,357 in Madras Presidency; 601,847 in U. P.; 496,351 in B. & O.; 390,854 in the Punjab; 306,115 in Bengal; 283,895 in C. P.; 280,443 in Bombay Presidency; 126,466 in Burma; 87,998 in Assam; 20,969 in N.-W. F. P.; 12,314 in Delhi; 5,726 in Ajmer-Merwara and 505 in Coorg. The birth rate exceeded the death rate in every province, the largest differences being recorded in Delhi (+19 p.m.), C. P. (+18), Punjab (+16), Madras (+14), B. & O. (+13), Bombay (+13) and U. P. (+12). In Coorg the difference was only +3 p.m.; this is accounted for by the fact that in this province a large proportion of the population are immigrant plantation labourers who leave their families at home in Mysore State and Madras Presidency.



In *B. & O.*, the district birth rates varied between 44 p.m. in Gaya and 25 p.m. in Singhbhum; in the *U. P.*, between 48 p.m. in Moradabad and 22 p.m. in Rae Bareilly; in the *Punjab*, between 50 p.m. in Gurgaon and 34 p.m. in Lahore. In the *C. P.* high rates were recorded in Betul district 52 p.m., in Nimar 51 p.m. and in Nagpur 50 p.m.; whilst the lowest rates were 38 p.m. in the district of Balaghat and 40 p.m. in Mandla. In the *Madras Presidency*, the persistently low recorded birth rate in Ramnad district was ascribed to defective registration but improvement in that respect was in progress. In the *Bombay Presidency*, West Khandesh district again returned the highest birth rate of 48 p.m. and Hyderabad the low rate of 14 p.m. In some municipalities rates below 20 p.m. were registered, these being attributed to inefficient registration. In *Sind*, the urban birth rate was 35 p.m. whilst the rural rate was only 17 p.m.; the recorded rate for the whole area fell, probably owing to the increased prevalence of malaria, other fevers and respiratory diseases. Karachi recorded a rate of over 40 p.m.; 9 towns had rates between 20 and 35 p.m.; and 9 others between 10 and 20 p.m. In *Burma*, the recorded birth rate has steadily increased during the last 5 years; male births exceeded the female in every district except Kyaukpnyu, Kyaukse and Myingyan.

Natural increases accruing from excess of births over deaths for decennial periods from 1881 to 1930 and for individual years from 1926-32 are given in Table I (x). It is to be noted that registration of births was carried out in all the provinces only since 1881, registration previously having been confined to selected areas such as municipal towns.

TABLE I (x).

		Annual number of births.	Birth rate p.m.	Annual number of deaths.	Death rate p.m.	Excess of births over deaths.
1871—1880	. . .	Not available.		3,540,202	20	..
1881—1890	. . .	4,565,687	24	5,058,578	26	—492,891
1891—1900	. . .	7,174,694	34	6,682,417	31	+512,277
1901—1910	. . .	8,591,136	38	7,657,513	34	+933,623
1911—1920	. . .	8,810,018	37	8,142,364	34	+667,654
1921—1930	. . .	8,345,364	35	6,347,063	26	+1,995,301
1926	. . .	8,395,679	35	6,460,610	27	+1,935,069
1927	. . .	8,516,706	35	6,009,729	25	+2,506,977
1928	. . .	8,882,573	37	6,180,114	26	+2,702,459
1929	. . .	8,565,341	36	6,267,391	26	+2,297,950
1930	. . .	8,690,714	36	6,483,449	27	+2,207,265
1931	. . .	9,135,890	35	6,615,099	25	+2,520,791
1932	. . .	9,054,506	34	5,805,666	22	+3,248,840

Table I (xi) gives births by quarters of the year; as usual, the largest number was recorded in the fourth and the lowest in the second,

groups from 15 to 40 years. This figure is 166 p.m. for British India as against 169 in 1931. Table I (viii) gives details for each province.

TABLE I (viii).

	Female population, 15-40 years.	Total births.	Rate p.m.
<b>British India</b>	<b>54,651,864</b>	<b>9,054,506</b>	<b>166</b>
N.-W. F. P.	458,725	68,146	149
Punjab	4,242,906	970,236	229
Delhi	121,097	28,051	232
U. P.	9,584,110	1,678,072	175
B. & O.	7,860,513	1,272,296	162
Bengal	10,415,796	1,328,334	128
C. P.	3,210,739	700,872	218
Bombay	4,407,754	782,917	178
Madras	10,184,415	1,627,381	160
Coorg	33,176	4,322	130
Assam	1,548,153	238,319	154
Burma	2,474,944	335,886	136
Ajmer-Merwara	109,536	19,674	180

For purposes of comparison, the birth rates in British India and those of a number of other countries are given in Table I (ix).

TABLE I (ix).

	Quinquennial.		Annual.				
	1921-25.	1926-30.	1928.	1929.	1930.	1931.	1932.
<b>British India</b>	<b>33.4</b>	<b>35.7</b>	<b>36.8</b>	<b>35.5</b>	<b>36.0</b>	<b>34.3</b>	<b>33.7</b>
England and Wales	19.9	16.7	16.7	16.3	16.3	15.8	15.3
Scotland	23.0	19.9	19.9	19.2	19.5	19.0	18.6
Austria	22.2	17.6	17.5	16.7	16.8	15.9	..
Belgium	20.4	18.6	18.4	18.2	18.7	18.2	..
Czechoslovakia	27.1	23.2	23.3	22.4	22.7	21.5	..
Denmark	22.3	19.4	19.6	18.6	18.7	18.0	..
Finland	24.9	22.8	23.2	22.6	22.2	20.7	..
France	19.3	18.2	18.3	17.7	18.0	17.4	17.3
Germany	21.1	18.4	18.6	17.9	17.5	16.0	..
Hungary	29.4	26.0	26.4	25.1	25.4	23.7	23.0
Italy	29.7	26.8	26.7	25.6	26.7	24.9	23.8
Netherlands	25.7	23.2	23.3	22.8	23.0	22.2	22.0
Norway	22.1	18.0	17.8	17.3	17.4	16.7	..
Portugal	33.5	31.9	32.6	30.6	30.6	30.5	29.9
Roumania	37.9	35.2	35.9	34.1	35.0	33.3	..
Spain	29.8	28.5	29.0	28.1	28.2	27.4	28.1
Sweden	19.1	15.9	16.1	15.2	15.4	14.8	..
Switzerland	19.5	17.5	17.4	17.1	17.2	16.7	16.7
Australia	23.9	21.0	21.3	20.3	19.9	18.2	16.9
Canada	27.4	24.1	24.1	23.5	23.9	23.2	22.4
New Zealand	22.2	19.7	19.6	19.0	18.8	18.4	17.1
South Africa (white)	27.1	26.1	25.8	26.2	26.6	25.5	24.3
U. S. A.	22.5	19.7	19.8	18.9	18.9	17.8	17.4
Japan	34.6	33.4	34.4	33.0	32.4	32.2	..
Egypt	43.0	44.1	43.7	44.4	45.7	44.8	..

Compiled from the Statistical Year Book of the League of Nations 1932-33, Geneva, 1933.

Rural and urban areas recorded 8,143,514 and 910,922 live-births, the rates being 33·6 and 34·4 p.m. respectively. The urban rate exceeded that for 1931 in every province except Bengal. Table I (vi) gives relative rates for the rural and urban areas of each province.

TABLE I (vi).

	Births.		Rate p.m.	
	Rural.	Urban.	Rural.	Urban.
<b>British India</b>	<b>8,143,514</b>	<b>910,922</b>	<b>33·6</b>	<b>34·4</b>
N.-W. F. P.	59,607	8,539	29	27
Punjab	853,271	116,965	41	37
Delhi	9,529	18,522	47	41
U. P.	1,504,076	173,996	33	46
B. & O.	1,241,351	30,945	34	22
Bengal	1,257,906	70,428	27	20
C. P.	623,763	77,100	45	46
Bombay	648,692	134,225	36	32
Madras	1,408,355	224,026	35	37
Coorg	3,938	384	25	40
Assam	232,678	5,641	30	29
Burma	291,918	43,968	27	31
Ajmer-Merwara	13,430	6,244	35	34

Birth rates for the chief communities are available for 7 provinces only and are given in Table I (vii).

TABLE I (vii).

	Hindus.		Muhamme- dans.		Christians.		Other classes.	
	1931.	1932.	1931.	1932.	1931.	1932.	1931.	1932.
N.-W. F. P.	28	28	31	39	20	22	82	82
Delhi	43	45	43	45	16	20	42	44
U. P.	36	35	37	36	10	10	16	17
Madras	36	36	37	37	31	30	36	36
Coorg	25	27	19	25	18	16	..	9
Burma	14	15	25	25	18	18	28*	29*
Ajmer-Merwara	36	34	37	33	8	7	3	24

\*Burmese.

In order to obtain a more accurate index of fertility and natality, the birth rate has been calculated on the estimated population of the child-bearing

Those in Assam were closed down at the end of May and cost only Rs. 11,330. In Bengal, distress continued till the end of September in the Rangpur, Bogra, Pabna and Mymensingh districts. In Burma, scarcity relief operations were in progress in 8 or 9 districts. By the middle of June conditions had improved and although it was hoped to close the works by July, conditions in the districts of Prome and Thayetmyo necessitated their continuance. Relief works were in progress in the Prome and Yamethin districts but operations since the middle of July were on a more restricted scale. In the C. P. & Berar test works were in progress from March to the end of July in parts of the Buldana, Yeotmal, Amraoti and Akola districts.

In Madras, conditions in the east of the Bellary district, a tract frequently subject to drought, had been causing anxiety since November, 1931, and road works under the control of the district board were started early in the year. The local Government opened test works in order to determine the necessity of providing relief under the Famine Code. Gratuitous relief was at first provided for dependents of the workers, but this was discontinued in June and the works were closed at the end of September. Relief to the agriculturists of the affected area was also provided in the shape of suspension of land revenue and distribution of agricultural loans.

Hissar district in the Punjab which has frequently been subject to visitations of famine, again suffered from scarcity of food and fodder during 1932-33 and test relief works were opened at the beginning of January, 1933. Road works under the district board were also in progress. A private relief committee did useful work, mainly in the form of distributing cotton and wool for spinning in the affected villages.

### Live-births.

6. *British India*.—Live-births registered during 1932 numbered 9,054,506 (4,702,913 males and 4,351,593 females), or 81,384 less than the figure for 1931. Table I (v) gives the registered numbers and rates *per mille* according to sex for British India and the various provinces. The highest rate was recorded in the Central Provinces and the lowest in Bengal and in Coorg.

TABLE I (v).

	Births.			Rate p.m.				Mean (1927-31).		
	M.	F.	Total.	M.	F.	Total		M.	F.	Total.
						1932.	1931.			
<b>British India</b>	<b>4,702,913</b>	<b>4,351,593</b>	<b>9,054,506</b>	<b>34</b>	<b>33</b>	<b>34</b>	<b>34</b>	<b>19</b>	<b>17</b>	<b>36</b>
N.-W. F. P.	38,520	29,626	68,146	30	27	29	31	16	12	28
Punjab	512,408	457,828	970,236	39	42	41	43	21	19	39
Delhi	14,598	13,483	28,081	39	49	43	42	25	23	48
U. P.	888,045	790,027	1,678,072	35	34	34	36	19	17	36
B. & O.	650,760	621,586	1,272,296	34	33	33	34	17	16	33
Bengal	691,737	636,597	1,328,334	27	26	26	28	14	13	27
C. P.	358,758	342,114	700,872	46	44	45	44	22	22	46
Bombay	406,947	375,970	782,917	35	38	35	36	19	18	37
Madras	834,153	793,228	1,627,381	37	34	35	34	19	18	37
Coorg	2,254	2,068	4,322	25	28	26	25	11	10	22
Assam	122,845	115,474	238,319	29	31	30	28	14	13	27
Burma	173,479	164,407	337,886	27	27	27	26	14	13	27
Ajmer-Merwara	10,439	9,235	19,674	35	35	35	34	18	16	38

nearly every district; other main crops exceeded the normal or were nearly normal in 12 districts. The outturn of groundnuts increased by 40% to 1,728,910 tons.

Retail prices of the principal food grains in March, 1933, were on the whole lower than in 1931-32. Average prices of articles of import and export also declined. Agricultural labour paid in kind was little affected by the general economic depression but that paid in cash improved appreciably. Stocks of food grains and the supply of fodder were generally sufficient. Mortality from contagious disease among cattle was heavy in the districts of Kurnool, Nellore and Chittoor. Rinderpest which was severe in the districts of Kurnool and Nellore accounted for 32% of the total deaths; blackquarter 23%; anthrax 9%; hæmorrhagic septicæmia 16% and foot-and-mouth disease 3%.

*Assam.*—During the year 1932-33, a total of 5,958,367 acres was cropped, including 4,870,500 acres under rice, 428,120 acres under tea, 415,435 under fruit and vegetables, 271,354 under rape and mustard, 212,726 under "other food crops" and 127,516 under jute. The rice harvests totalled 1,677,200 tons including autumn rice 231,300 tons, or 85% of the normal; winter rice 1,361,200 tons, or 90% of the normal; and spring rice 84,700 tons, or 94% of the normal. Jute outturn amounted to 340,100 bales as against 196,600 bales in 1931-32, whilst the total yield of tea crops was 106% of the normal. Wholesale prices of rice, mustard seed and raw sugar were lower than the normal. Judging from these figures, it may be concluded that the economic condition of the agriculturist was fairly good.

*Burma.*—Total rainfall was about 25% below normal except in 6 districts of Lower Burma and 4 of Upper Burma. The gross harvested area increased to 16,771,820 acres owing to a more favourable season. That under rice totalled 12,049,503 acres, an increase of 184,349 of which 77% occurred in Lower Burma. The total outturn amounted to 7,058,453 tons or 18% above the figure for 1931-32.

The area under sesamum increased to 1,599,996 acres and the total outturn was 57,760 tons or 105% of the normal. Areas under cotton and groundnuts also showed increases, the districts of Myingyan and Sagaing being responsible for 70% of the former and Magwe and Myingyan for about 70,000 acres of the latter. In the chief cotton growing districts the yield was said to be nearly three times that of 1931-32.

Paddy prices were generally lower and those of other crops also ruled easier, although cotton showed little variation. Despite good yields, wages continued to fall and agricultural indebtedness increased. In spite of the reduced cost of living, the position of the agricultural labourer was precarious. The health of the cattle was generally satisfactory, but outbreaks of contagious disease were reported from every division in the province. Reclamation of water-logged areas received attention and many important irrigation works were undertaken.

#### **Famine conditions and their relief.**

5. The test works which were in operation in Assam, Bengal, Burma and the C. P. during the previous year continued during 1932-33.

Khulna, Malda, Faridpur and Tippera. There was no serious outbreak of epidemic disease.

*C. P.*—Total rainfall averaged 55 inches in the C. P. proper and 33 inches in Berar and, except in 4 districts, was 7% to 32% above normal. The year consequently was distinctly better than 1931-32.

Owing to unfavourable sowing conditions, the *kharif* area diminished by 919,301 acres, or 9% mainly in respect of *juar* and cotton. The area under cotton in the C. P. proper decreased to 1,292,003 acres, or by 23% and in Berar to 2,828,306 acres, or by 11%. These decreases were ascribed to the fact that, because of the slump and of previous adverse climatic conditions the agriculturists who had been tempted in the past to bring too large areas under this crop, now had concentrated on soils particularly suited to cotton. The area under *juar* decreased by 5% in the C. P. proper and by 3% in Berar; that under rice increased by 1%; that under *til* by 22%. The *rabi* crops, mainly *juar* and *til*, gram and linseed, increased by 188,034 acres or 4%.

The net cropped area decreased to 24,556,317 acres, this being due mainly to adverse climatic conditions and trade depression. The double cropped area also fell by 30,223 acres. The irrigated area increased to 1,228,358 acres; large increases occurring particularly in the central rice belt. In the chief rice-growing districts, outturns ranged from normal to a full crop; in others they varied between 64% in Buldana and 98% in Nimar. The outturn of rice totalled 1,659,800 tons; of *juar* 944,500 tons; and of cotton 722,700 bales or 216,900 more than 1931-32.

Average wholesale prices of rice, cotton and *til* fell by 9%, 27%, and 21%, those of *juar*, wheat, gram and linseed rose by 3%, 19%, 8% and 4% respectively. Owing to a series of good harvests in the rice-growing areas, the agriculturists were not as hard hit by the economic depression as in other areas. In the north and in the cotton producing areas, although the money market was tight and the cultivator found it difficult to obtain credit, economic conditions showed a slight improvement.

*Madras Presidency.*—The season was fairly satisfactory and better than the previous year. Of the total area available for cultivation, only 34,186,205 acres or 59% were cultivated, 18% was fallow and 23% remained cultivable waste. Irrigated land totalled 9,229,571 acres. The total cropped area aggregated 39,163,609 acres,—the highest figure since 1906-07. The increase occurred chiefly among non-food crops as the area of food crops decreased slightly. In the districts of Ganjam, Chingleput, South Kanara and in the deltas of West Godavari and Tanjore the most important food crop is paddy and this occupied more than 50% of the total sown area. Among the non-food crops, groundnut, gingelly, sunhemp, coffee, tea, betelvine, areca nuts and fodder were largely cultivated; whilst the areas under linseed, cotton Bombay hemp and indigo were the lowest reported.

Taken as a whole, the yield of crops per acre varied from 96% to 105%, of the normal except in the cases of unirrigated cotton 90%, indigo 75% and *korra* 120%. The outturn of cotton per acre was below normal in

80%, rapeseed to 75%, barley was the same 80%, grain fell to 75% and tobacco to 80%.

Prices of food grains fluctuated. The condition of agricultural stock was on the whole satisfactory and the supply of fodder was generally sufficient.

*B. & O.*—The harvests of the principal crops, rice, *bhadoi* and *rabi*, were all fairly satisfactory except in Tirhut division where the first two suffered from deficient rainfall. The harvested area decreased from 30,090,400 acres in 1931-32 to 29,264,100, this total including 7,741,400 under *bhadoi*, 10,280,000 under *aghani*, 10,614,200 under *rabi* and 628,500 under fruit and vegetables.

The *bhadoi* crop was estimated at 85% of the decennial average; those of maize and autumn rice at 561,800 and 935,800 tons respectively; and those of jute and winter rice at 408,200 bales and 65,011,400 cwts. The *rabi* crop, which is the most important in Bihar and in Cuttack, Hazaribagh and Palamau were damaged to some extent by rain, frost and hail in 8 districts. The wheat crop totalled 492,500 tons, or 91% of the decennial average; spring oilseeds totalled 279,700 tons or 90%; castor 8,000 tons or 99% and other *rabi* crops 3,392,700 tons or 88%. Weather conditions were generally favourable in the cotton growing districts and the yield was fair to good, but the total outturn of 13,048 bales was 4% less than in 1931-32. Gross outturns of the *bhadoi*, *aghani* and *rabi* harvests were, estimated at 85%, 77% and 88% of the average.

Prices of food grains ruled lower, whilst stocks were generally sufficient except in Saran and Palamau. The condition of the cattle was satisfactory except in Ranchi. Sambalpur, Balasore, and North Bhagalpur, where rinderpest prevailed in virulent form; in the last area, grazing was also scarce. The opening of field veterinary dispensaries at important centres was a feature; castrations by the Burdizzo method were carried out extensively. No agricultural deterioration was reported. The economic condition of the people was on the whole satisfactory, although the fall in prices and trade depression had adverse effects. The demand for labour decreased and there was continued emigration from Ranchi and Puri to Calcutta, Jamshedpur, and Rangoon.

*Bengal.*—The season was generally satisfactory for winter and spring crops but only fairly favourable for autumn crops. The cropped area totalled 28,174,700 acres as compared with a normal of 31,098,500. The area under food grains amounted to 23,277,100 acres as against a normal of 24,836,100 acres, of which rice was 21,771,400 acres. Sugar crops were again in excess of normal, the figure being 290,700 acres. Cropped areas for tea, tobacco, cinchona, Indian hemp and other drugs and narcotics also exceeded their normal. The *bhadoi* crops were estimated at 79% of the normal; winter rice 90%, sugarcane 94% and *rabi* crops 81%. The outturn of jute amounted to 5,088,800 bales of 400 lbs. each and that of cotton to 21,312 bales.

Prices ruled easier and labourers' wages were generally lower so that the economic condition of the agricultural population continued to be unsatisfactory. Agricultural deterioration was reported in the districts of Jessore,

The totals for the principal crops were :—

	Tons.	Variations from normal%
Wheat	2,812,500	+3
Rice	443,900	—7
Maize	347,900	—6
Gram	894,000	—11
Barley	150,000	—43
Jowar	117,000	+12
Bajra	325,900	—10
Rabi oil-seeds	150,700	—12
Sugar-cane	444,100	+32
Tobacco	30,200	..
Cotton	554,900 bales	—7

Prices of all the important crops, except rapeseed, raw sugar and tobacco, were higher than in 1931-32 but were generally still less than pre-war rates. The rises were ascribed to low yields and to general market conditions. Stocks of food grains were generally sufficient except in a few districts. Scarcity of fodder was reported in some districts. The condition of agricultural stock was generally fair and outbreaks of cattle disease were not serious and did not interfere appreciably with agricultural operations. The waterlogged areas in the districts of Karnal, Siolkot, Gujranwala, Gujrat, Sheikhpura and Shahpur have been greatly improved by the drainage schemes in progress. In Jhang district, waterlogging is said to be on the increase. The fall in water levels in the districts of Jullundur and Hoshiarpur and the deterioration of land by *sem*, *kallar* and *thur* in some areas in Montgomery and Lahore districts were again the cause of complaint.

Public health was generally good and outbreaks of epidemic disease did not interfere with agricultural operations to any serious extent. Economic conditions were, however, still unsatisfactory, although the rise in prices somewhat improved the stability of the *zamindars*.

*U. P.*—The season was on the whole unfavourable to *khariif* crops, the area under cultivation diminishing by 3 % as compared with the normal. The *rabi* crops suffered considerably from unfavourable rains and the area under cultivation fell by 4 %. A decrease of 10 % was recorded in the double cropped area, whilst hot weather crops increased by about 27 %. Frost and hailstorms did some damage and the net cropped area declined slightly to 35,044,685 acres.

With the opening of numerous new sugar mills, the area under sugarcane showed a marked increase and that under cotton a marked decrease. Owing to unfavourable rains and the fall in prices, the area under linseed diminished. Scanty rainfall was partly responsible for the lower figure of 9,968,747 acres in the net irrigated area.

The outturn of late rice was only 50% of the normal; similar figures for early rice were 60%, maize 75% and sugarcane 82%. The total yields of *bajra* and cotton, which were much below normal in 1931-32 rose to 75% and 80% respectively of the normal and those of *juar*, indigo and *til* also showed slight improvement. Absence or insufficiency of winter rains reduced the yield of the *rabi* crops to 25% below normal; wheat rose to 80%, linseed to



### Agricultural and Economic Conditions (1932-33).

4. *N. W. F. P.*—The total area harvested amounted to 1,985,732 acres which was 9 % below normal. The *Kharif* area cropped, aggregating 697,864 acres, was 9 % below normal; and the *rabi* harvest also showed a decrease owing to unfavourable climatic conditions. Of the sown *rabi* area, 78 % matured as against 85 % in 1931-32. Irrigated crops, aggregating 963,974 acres, or 36 % of the total sown area, showed a slight increase over normal. The rice crop area was 9 % below the figure for 1931-32 and 15 % above normal; *jowar*, *bajra*, sugarcane and gram showed increases and maize, cotton, wheat, barley and rapeseed showed decreases. Wheat which amounted to 38 % of the total sown area, is the most important crop of the province and totalled 236,825 tons. Hailstorms caused damage in some districts and in the North Waziristan and Kurram Agencies.

Prices of all food grains continued to rule easier and stocks of food grains and fodder were generally sufficient. Drinking water was scarce in some parts of Kohat district. The economic position of the agricultural population was depressed owing to the fall in prices, the resultant contraction in the credit of the cultivator and the general depression in trade. The fall in wages of the agricultural population was not so great as the fall in prices.

Smallpox prevailed in the districts of Peshawar and Bannu and malaria in North Waziristan and Bannu district. A few cases of foot-and-mouth disease and hæmorrhagic septicæmia were reported in Bannu district.

*Punjab*.—Climatic conditions were generally favourable for the sowing of all *kharif* crops except cotton, but not so good for maturing; they were on the whole unfavourable for *rabi* sowings, though light to moderate rainfall in December, 1932, and January to March, 1933, proved useful for maturing. Some damage was caused to cotton crops by frost and bollworm and to *rabi* harvests in certain districts by cold winds and hailstorms. Slight attacks of smut in the wheat crops were reported.

The total sown area decreased from 32,006,677 acres in 1931-32 to 30,057,262 in 1932-33; the decennial average being 30,889,300 acres. The matured area, which was 78 % of the sown decreased from 26,738,844 to 23,443,042 acres, the decennial average being 25,833,900 acres. The area failing to harvest totalled 6,614,220 acres as compared with 5,267,833 in 1931-32 and 5,055,400 the decennial mean. Irrigated sown areas increased to 48 % of the total.

NOTE.—The facts and figures given in this section have been taken from the Agricultural Department Publications and Communiqués on season and crop reports.

*Rabi* crops are those sown after the rains and reaped in the first 3 or 4 months of the ensuing year, i.e., in the spring (March-April); the *kharif* crops are those sown before the commencement of the rains (April-May) and reaped after their close (October-November); the *Shadvi* and *Aghani* crops are also autumnal, the former being harvested in August-September and the latter in November-December.

Taking the year as a whole, rainfall over the country was within 20 % of the normal in all sub-divisions except Mysore where there was an excess of 32 %. The main feature of the cold weather months was the unusually northerly course of most of the western disturbances during January resulting in scanty precipitation in the plains of N. W. India. During January and February, total rainfall was in large excess in Hyderabad and Mysore ; in moderate excess in Burma ; normal in Assam, in N. W. F. P. and in Madras Presidency ; and in moderate or large defect elsewhere. Over the plains of India as a whole, the average rainfall of this period was in defect by 34 %. The unusual northerly course of the western disturbances was also responsible for mild winter conditions in N. W. India and its neighbourhood.

During the hot weather months of March to May, rainfall was in large excess in Madras Presidency ; in slight to moderate excess in the N. W. F. P., in Bombay Presidency and in Mysore ; and normal in Assam, Bengal and Rajputana. Elsewhere it was in slight to moderate defect. Over the plains as a whole, there was a defect of 3 % in the season's rainfall.

In spite of a rather weak monsoon in June and a prolonged break in the rains in August, rainfall during the monsoon months of June to September was on the whole well distributed and was within 20 % of the normal. Over the plains as a whole, the rainfall in this period was in defect by 3 %.

During the retreating S. W. monsoon months of October to December, rainfall was in moderate to large excess in Bengal, B. & O., Bombay Presidency, Mysore and Madras Presidency, in slight excess in Assam and Hyderabad ; normal in the Punjab ; in slight defect in Burma ; and in moderate to large defect elsewhere. Over the plains as a whole there was an excess of 18 % during this period.

Table I (*iv*) gives details.

TABLE I (*iv*) —

*Rainfall in inches.*

	January and February.		March to May.		June to September.		October to December.		Total.	Departure from normal.
	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.	Ac- tual.	Nor- mal.		
<b>Mean of India</b>	0.7	1.0	4.9	5.1	35.5	36.7	5.9	5.0	47.0	-0.7
N. W. F. P.	2.3	2.5	4.7	4.2	8.8	7.8	0.5	1.1	16.2	+0.6
Punjab	1.2	1.9	1.6	1.0	14.2	15.3	0.0	0.8	17.9	-2.1
U. P.	0.2	1.5	0.7	1.4	28.4	35.5	1.3	1.8	30.6	-7.5
B. and O.	0.8	1.4	2.6	4.0	35.2	42.7	5.5	3.8	44.1	-7.8
Bengal	0.7	1.3	12.3	12.7	48.7	55.0	9.2	6.0	71.0	-4.0
C. P.	0.8	1.3	1.1	1.7	43.9	40.7	1.9	2.7	47.6	+1.2
Bombay	—	0.2	1.9	1.6	41.7	39.9	6.7	3.5	50.2	+5.0
Madras	1.1	1.2	10.5	6.0	26.4	29.0	21.2	15.8	59.2	+7.2
Assam	2.1	2.2	24.1	25.0	70.4	66.1	8.4	6.9	105.0	+4.7
Burma	0.5	0.3	8.1	10.5	61.2	62.1	8.1	9.2	77.8	-4.3
Sind	—	0.5	0.3	0.5	6.6	5.5	0.2	0.9	6.9	+0.2
Rajputana	0.1	0.6	0.9	0.9	17.5	19.2	0.1	0.7	18.5	-2.8
Central India	0.2	0.9	0.5	0.9	34.1	33.3	0.4	1.6	35.3	-1.3
Hyderabad	1.0	0.4	1.5	1.9	25.4	26.4	4.4	3.8	32.3	-0.2
Mysore	0.6	0.3	7.3	5.3	25.8	22.4	14.1	8.2	47.8	+11.6

TABLE I (ii).

*Mid-year estimated population, 1932.*

	Estimated population 30th June, 1931.	Excess of births over deaths.	Estimated population 30th June, 1932.
<b>British India</b>	<b>266,536,141</b>	<b>2,387,423</b>	<b>268,923,564</b>
N.-W. F. P.	2,367,581	23,883	2,391,464
Punjab	23,535,787	409,242	23,945,029
Delhi	637,664	11,435	649,099
U. P.	48,451,761	412,639	48,864,400
B. & O.	37,804,714	235,191	38,039,905
Bengal	50,046,202	107,153	50,243,355
C. P.	15,558,488	151,539	15,710,027
Bombay	21,906,147	250,082	22,156,229
Madras	45,411,985	510,379	45,922,364
Coorg	163,324	338	163,662
Assam	7,945,407	76,557	8,021,964
Burma	12,147,020	105,617	12,252,637
Ajmer-Merwara	560,061	3,368	563,429

TABLE I (iii).

*Estimated population by sex and age.*

	Males.	Females.	Total.
<b>All ages</b>	<b>138,532,828</b>	<b>130,390,736</b>	<b>268,923,564</b>
0—5 years	18,935,132	19,237,072	38,172,204
5—10 "	18,305,995	16,576,580	34,882,575
10—15 "	16,799,332	14,738,992	31,538,324
15—20 "	12,715,757	12,633,882	25,349,639
20—30 "	24,290,575	24,170,957	48,461,532
30—40 "	19,972,010	17,847,025	37,819,035
40—50 "	13,754,926	12,017,404	25,772,330
50—60 "	8,208,074	7,620,326	15,828,400
60 years and upwards	5,551,027	5,548,498	11,099,525

*Emigration and immigration.*—The number of unskilled emigrants from Madras to Malaya decreased from 42,279 in 1930 to 102 in 1931 and to 17 in 1932; those emigrating to Ceylon fell from 68,337 in 1931 to 50,869. Immigrants from the same colonies numbered 72,225 excluding those who returned at their own expense. Immigrants to Burma numbered 300,368; and emigrants from that province 288,494. Those immigrating to Assam increased to 73,594 in 1932; 6,752 emigrants from this province passed through Tezpur depot.

**Rainfall and other weather conditions.**

3. Through the courtesy of the Director General of Observatories some of the important features regarding rainfall and weather conditions are given below.

The chief vital statistical facts relating to British India for 1932 are as follows :—

1. The birth rate was 33·7 as compared with 34·3 in 1931.
2. The death rate was 21·6 as compared with 24·8 in 1931.
3. The infantile mortality rate per 1,000 live-births was 163·7 as against 178·8 in 1931.

These facts can be best appreciated by consulting the chart facing page 5 and Table I (i) below, where the rates for British India are compared with those for certain other countries.

TABLE I (i).

	Birth rate <i>per mille.</i>	Death rate <i>per mille.</i>	Infantile death rate per 1,000 births.
<b>British India . . .</b>	<b>33·7</b>	<b>21·6</b>	<b>169</b>
England and Wales . . .	15·3	12·0	65
Scotland . . . . .	18·6	13·5	86
 Australia . . . . .	 16·9	 8·7	 41
New Zealand . . . . .	17·1	8·0	31
Canada . . . . .	22·4	9·9	73
 Union of South Africa . . . . .	 24·3	 9·9	 69
Federated Malay States . . . . .	34·0	18·5	139
Palestine . . . . .	44·9	20·7	170
 United States of America . . . . .	 17·4	 10·8	 58
Japan . . . . .	32·2	19·0	132
Egypt . . . . .	44·8	26·8	160

### Population.

2. Tables I (ii) and I (iii) give mid-year estimated populations by provinces and by sex and age.

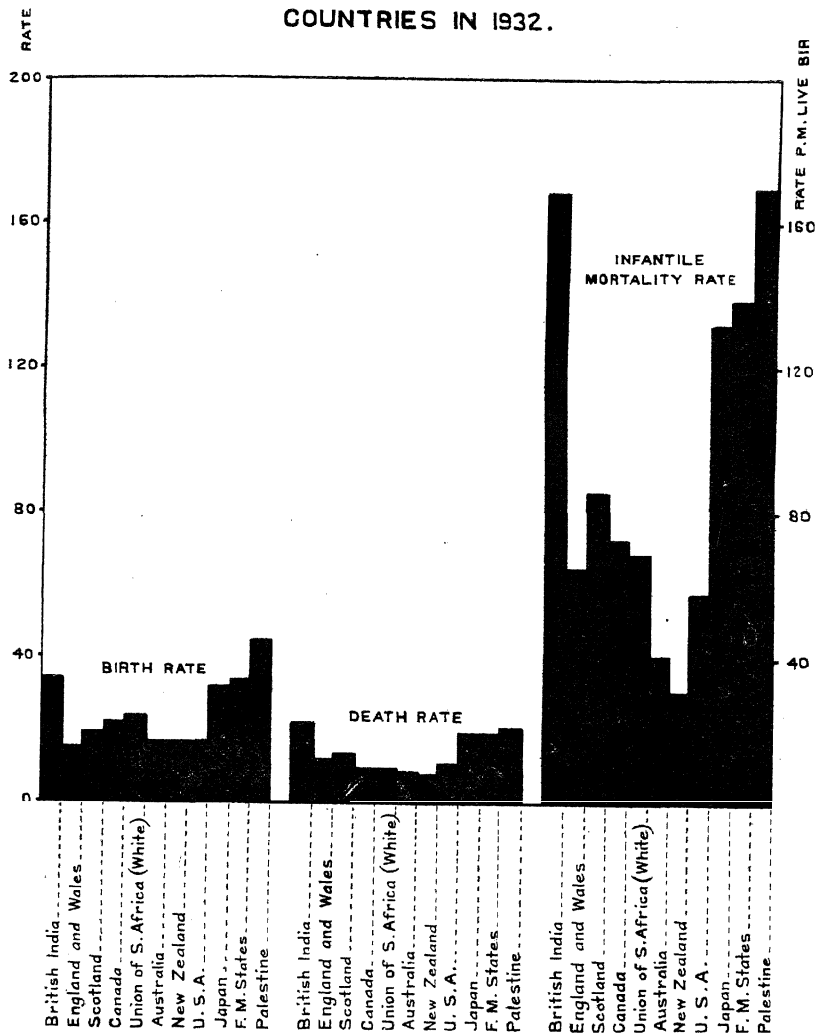
#### Abbreviations—

N.-W. F. P.	North-West Frontier Province.	P. M.	<i>Per mille</i>
U. P.	United Provinces of Agra and Oudh.	R.	Rural.
B. and O.	Bihar and Orissa.	U.	Urban.
C. P.	Central Provinces and Berar.	M.	Male.
D. P. H.	Director of Public Health.	F.	Female.
Mopties	Municipalities.		



No 1

# A COMPARISON OF BIRTH, DEATH AND INFANTILE MORTALITY RATES OF INDIA WITH OTHER COUNTRIES IN 1932.



more than in 1931. Several authorities have expressed the opinion that many of the provinces of India are already overcrowded and Mr. Wattal in his recent volume "The population problem in India" gives official figures in support. Where are those additional 50 millions of people to find bread? How are the adult survivors later on to find employment? Can improved methods of agriculture and the extension of cultivation to unused land provide the additional food supplies required? These questions are of immediate importance and will necessarily confront the Government of India within the next few years. But others are equally pressing, and, in inviting attention to those, I cannot do better than quote from a recent pronouncement made by Major General Sir Robert McCarrison, Director of Nutritional Research in India, in his introduction to an article on "Dietetics : Food and Race" published by Professor Kanga of Ahmedabad. He writes :

"It is apt to be forgotten that the well-being of a people depends more on proper nutrition and efficient sanitation than on aught else. The proper nutrition of her people, the adjustment of the food supply to the population and of the population to the food supply, the provision of efficient sanitation in her towns and villages : these are India's needs ; all else is of secondary importance."

"My own concern has been mainly with nutrition ; and my researches have led me to the conclusion that the diet of many millions of the Indian people is not such as can maintain physical efficiency and health. They are condemned, from their mothers' wombs, to a sub-normal or diseased existence as certainly as is the engine of the best motor car when not provided with efficient lubrication or when supplied with an improper fuel. Intestinal disease, kidney disease, pancreatic disease, stone-in-the-bladder, beri-beri, epidemic dropsy, malnutrition, oedema, anemias, scurvy, rickets, osteomalacia, pellagra, lathyrism, disorders of pregnancy, keratomalacia, night blindness, tetany, dental caries, and above all, greatly increased susceptibility to infectious diseases ; all these, and more, have been shown to be directly or indirectly due to faulty nutrition. Surely a matter of such moment is the concern of every person of education, influence or wealth ; of every employer of labour ; of every humanist."

What can be done about it? How are additional and improved food supplies to be obtained? How is the general standard of living to be raised? Major General Sir John Megaw, late Director-General, I.M.S., and others have written of the gloomy outlook for the future "not only for the masses of the people who must face an intensified struggle for bare subsistence but also for the upper classes whose incomes depend on the production of a surplus of crops and other commodities". The suggestion has been made that in order to review the situation before India reaches disaster, a commission of experts should be appointed to examine every aspect of economic life of India, to make an accurate survey of the present position and a reliable forecast for the future. This is no place to discuss in detail the measures which are required ; these must necessarily include energetic steps for the prevention of disease and equally energetic measures for the education of the people in regard to mastery over environment. But there can be no doubt that the circumstances are such as demand the urgent attention of both Central and Provincial Governments and a wide development of both central and provincial public health departments manned by experts capable of advising on the many difficult health problems which confront the leaders of this country. On the interpretation of these problems and on the lines of action adopted for their solution will depend the prosperity, health and welfare of many generations yet unborn.

be noted, too, that the rates have been given only to the nearest unit, except in especially important instances. Decimal points, even to the first place, can only lend a spurious air of accuracy to figures admittedly based on mere approximations.

The question of the organisation and functions of the Public Health Department required by the Central Government of India has been mooted on many previous occasions and it seems only natural that on the eve of new constitutional reforms this subject should be uppermost in the mind of the public health adviser to the Government of India and should find a place in the preliminary paragraphs of his report. Under existing arrangements, all public health questions which come before the Government of India,—and these questions are not few in spite of public health being a 'transferred' subject,—are dealt with by the Public Health Commissioner alone, on whose shoulders have also been placed the administrative duties involved in the Secretaryship of the Indian Research Fund Association,—a body which corresponds in function to the Medical Research Council in England. The latter duties include not only administrative work but also the financial control of every item of expenditure incurred in every research enquiry conducted under the auspices of the Research Fund Association. These responsibilities, formerly carried out by an Assistant Director General (Sanitary) and for a time by a Director of Medical Research, debar the Public Health Commissioner from devoting due time to the real functions of his office. Certainly drastic modification of the situation is required if the Central Government under the new constitution is to have a suitable public health organisation, not only capable of advising on the numerous public health problems for which the new Federal Government will be directly responsible but capable of initiating fresh developments and of planning improvements. For the health and welfare of the peoples of India are *the* most important problems with which the new Governments,—Federal and Provincial,—will be faced almost as soon as they are brought into being. By some that statement may be looked upon as an exaggeration; it is, on the contrary, a plain statement of fact made without any suggestion of personal or departmental aggrandisement. It is one moreover which is becoming more and more evident to those who have examined actual figures and who have the vision to realise their implications. Here are some of those figures. The population of British India according to the census of 1931 was 271,526,933; that of India as a whole 352,837,778. The rate of increase during the decennium 1921-31 was no less than 10·6 per cent. which means that during these 10 years the population increased by nearly 34 millions. Various competent authorities have expressed the opinion that this rate of increase may be taken as the normal in the absence of any catastrophic occurrence like the influenza epidemic of 1918. At the time of writing, more than three years have passed since the last census and during these years the usual epidemic diseases, cholera, plague and smallpox, have all shown large decreases in incidence, whilst famine, in its death-dealing form at least, has been unknown. Since the end of February 1931, therefore, nearly 13 millions have been added to the population of India and the total must now be approximately 365 millions. On the assumption that existing conditions will continue, by 1941 when the next census is due to be taken, the population will probably be found to exceed 400 millions or nearly 50 million person



these he specifically mentioned (a) a better arrangement of the statistical tables, (b) the removal of much statistical matter from the narrative and (c) the introduction of observations of more general interest. Those who have been accustomed to consult these annual reports will note that, in the present volume, the statistical tables have been considerably modified; all lines have been abolished; and, as far as possible, figures for British India as a whole have been placed at the top of each table. In order to make the statistical matter more easily read and more suitable for reference purposes, the provinces have been arranged in the same order throughout and provincial figures have been arranged in groups of three. These changes may not seem of any great importance but without doubt they make the statistical tables more attractive, if such a word may be used in this connection.

As regards the removal of much of the statistical material included in the narrative, this will require more detailed consideration than it has yet been possible to give. The suggestion is certainly sound and could probably be best effected by inserting provincial tables in the appendices. That, however, might involve a certain amount of repetition and the greatest endeavour on this occasion has been devoted to deletion rather than to increase in the number of pages as it was felt that the limit of size had been reached. For example, comparative statistics of former years with a few important exceptions have been excluded as these are all to be found in previous reports. A certain number of statistical tables must of necessity appear in the narrative pages; certain changes have already been made and further deletions will probably be found feasible.

The introduction of observations on the varying subjects for which facts and figures are given would without doubt enhance the value and interest of these annual health reviews. But, as General Graham has remarked, for these additional expert staff is essential. Not only is it impossible for a single individual to find time amidst other multifarious duties for the study of figures purporting to refer to a population of 350 millions and to the numerous diseases which afflict the mass of Indian peoples, but in these days no one person can have the training and experience sufficient to make him an expert in all branches of public health. It would indeed be foolish to make any claim to such omniscience. Efforts have been made year by year to introduce discussions on particular subjects but, beyond these somewhat desultory attempts, it is under present circumstances impossible to go. Detailed discussion of epidemiological problems, for example, should obviously find a place in reviews of Indian health conditions, but epidemiological studies require time even if experience is available and unfortunately the time factor, as in other matters, is here beyond human control; in this case at least, it is outside the control of the Public Health Commissioner with the Government of India.

A further point which calls for comment at this juncture is the fact that, in contrast with previous years, birth and death rates have all been calculated on estimated populations for the year under review. These estimated populations, calculated as at 30th June, give a much more accurate basis for comparison of birth and death rates than the method hitherto practised. It is to

# Annual Report of the Public Health Commissioner with the Government of India for 1932.

## VOLUME I.

### SECTION I.

#### ON THE STATE OF THE PUBLIC HEALTH IN BRITISH INDIA AND SOME INDIAN STATES.

##### Introduction.

1. Major General Graham concluded his report for 1931 with an instructive summary of the chief public health events with which he had been intimately concerned during the 10 years he held office as Public Health Commissioner with the Government of India. The value of such a periodic review cannot be over-estimated, not only to the Government of India and their public health adviser but to the people of India and the world at large. General Graham's summary provides a chart on which numerous details have been marked but in which many areas still remain unexplored. As his successor is meantime reluctant to steer into unknown waters except with circumspection and caution, the present report contains little new in the way of critical comment or of attempted forecast. These must be reserved for possible future reviews when further time and wider opportunities have been made available for the study of the public health events which so deeply affect this great country. At the same time, certain features of India's health problems demand urgent attention and, as far as possible, these have been commented upon frankly. Their urgency demands plain speaking, for, in the hurly-burly of the present day world, politicians and the people they represent alike are in danger of forgetting, if they ever knew, that without health other things are as "dust and ashes". No apology is made for what may seem to be hyperbole; the scientifically trained mind abhors exaggeration as nature abhors a vacuum, and if the reader on occasion should at the first glance, consider certain statements unduly stressed, he must reconsider that impression in the light of the facts given in the course of this report.

In the summary to which reference has been made, after describing the changes effected in the substance and arrangement of his successive annual reports, General Graham envisaged further alterations which were sure to come and which in certain respects were perhaps already overdue. Amongst



# LIST OF ILLUSTRATIONS.

## MAPS.

1. Map showing infantile mortality *per mille* of live-births in British India during the year 1932. (*Between pages 20 & 21*).
2. Map showing the distribution of cholera mortality in British India in 1932. (*Between pages 34 & 35*).
3. Map showing the distribution of plague mortality in India during 1932. (*Between pages 44 & 45*).
4. Map showing the distribution of smallpox mortality in British India during 1932. (*Between pages 54 & 55*).

## CHARTS, GRAPHS, ETC.

1. Chart showing a comparison of birth, death and infantile mortality rates of British India with other countries in 1932. (*Facing page 4*).
2. Diagram showing marital condition by age and sex. (*Facing page 6*).
3. Diagram showing sexes at different age-periods. (*Facing page 6*).
4. Chart showing infantile mortality *per mille* of live-births in British India, England and Wales and British Dominions in 1932. (*Facing page 22*).
5. Diagram showing deaths by causes in 1932, compared with the decennial mean (1922-1931). (*Facing page 28*).
6. Chart showing cholera mortality by provinces in British India during the years 1877-1932. (*Between pages 32 & 33*).
7. Graph showing the weekly numbers of deaths from cholera in India from the year 1928 to 1932 and map showing changes in the geographical distribution of cholera in India during 1931 and 1932 (cases reported per 100,000). (*Facing page 34*).
8. Chart showing plague deaths reported in Northern India by four weekly periods, from July 1922 to December 1932. (*Page 44*).
9. Graph showing smallpox cases reported in India during the years 1930, 1931 and 1932 (by four weekly periods). (*Page 56*).
10. Vaccination graphs showing percentages of successful cases to total operations during 1932-33. (*Facing page 192*).

## SECTION XII.

## CONCLUSION.

PARA.	PAGE.
224. Introductory . . . . .	322
225. Population and the relation of numbers to food supplies, diet, physique, etc.	322
226. The importance of research to preventive medicine . . . .	327
227. Death statistics of Civil European Officers . . . . .	330
228. The Royal Commission on Labour and industrial disease . . .	331
229. Cerebro-spinal meningitis . . . . .	331
230. Co-ordination between medical and public health departments . .	332
231. Provincial public health departments and retrenchment . . .	333
232. The Central Government's public health policy . . . . .	334

(Appendices I-VI details on pages 337—338).

## SECTION X.

### HEALTH OF JAILS IN INDIA.

PARA.	PAGE.
190. Population . . . . .	293
191. Sick rate . . . . .	293
192. Admission rate . . . . .	294
193. Death rate . . . . .	294
194. General health . . . . .	294
195. Causes of sickness and mortality . . . . .	294
196. Influenza . . . . .	295
197. Cholera . . . . .	296
198. Smallpox . . . . .	296
199. Dysentery . . . . .	296
200. Diarrhoea . . . . .	297
201. Malaria . . . . .	298
202. Pneumonia . . . . .	299
203. Tubercle of the lungs . . . . .	299
204. Health of prisoners as evidenced by weight . . . . .	300
<i>Remarks on individual Provinces.</i>	
205. North-West Frontier Province . . . . .	301
206. Punjab . . . . .	301
207. United Provinces . . . . .	303
208. Bihar and Orissa . . . . .	304
209. Bengal Presidency . . . . .	305
210. Central Provinces . . . . .	306
211. Bombay Presidency . . . . .	307
212. Madras Presidency . . . . .	308
213. Coorg . . . . .	309
214. Assam . . . . .	309
215. Burma . . . . .	310
216. Andamans . . . . .	311
217. Conclusion . . . . .	313

## SECTION XI.

### INDIAN VOLUNTARY HEALTH ORGANISATIONS.

218. The Indian Red Cross Society including the Victoria Memorial Scholarships Fund and the King George Thanksgiving (anti-tuberculosis) Fund . . . . .	314
219. The St. John Ambulance Association (Indian Council) and the St. John Ambulance Brigade Overseas . . . . .	316
220. British Empire Leprosy Relief Association (Indian Council) . . . . .	317
221. The Countess of Dufferin's Fund and Women's Medical Service . . . . .	319
222. Lady Minto's Indian Nursing Association . . . . .	320
223. Other Indian Voluntary Health Societies—	
(a) The Bombay Presidency Baby and Health Week Association . . . . .	320
(b) Health Propaganda Board, Madras . . . . .	321

SECTION IX—*contd.*MEDICAL INSTITUTIONS—*contd.*I.—HOSPITALS AND DISPENSARIES—*contd.**A.—British India—contd.*

PARA.	PAGE.
155. Assam . . .	275
156. Burma . . .	276
157. Baluchistan . .	278
158. Aden . . .	278

*B.—Indian States.*

159. Burma (Federated Shan)	279
160. Mysore State . . .	279

## II.—MENTAL HOSPITALS.

161. Mental hospitals and their accommodation . . .	279
162. Population . . . . .	280
163. Occupations of patients . . . . .	280
164. Types of insanity and chief aetiological factors . .	281
165. Age and religion of patients . . . . .	282
166. Chief causes of mortality . . . . .	282
167. Method of treatment . . . . .	283
168. Water supplies . . . . .	283
169. Expenditure . . . . .	283

## III.—MEDICAL COLLEGES.

170. Punjab . . .	283
171. Delhi . . .	284
172. United Provinces .	284
173. Bihar and Orissa .	285
174. Bengal Presidency .	285
175. Bombay Presidency .	286
176. Madras Presidency .	287
177. Medical research .	288

## IV.—MEDICAL SCHOOLS.

178. General . . . . .	290
179. Punjab . . . . .	290
180. United Provinces . .	290
181. Bihar and Orissa . .	290
182. Bengal Presidency . .	291
183. Central Provinces . .	291
184. Central India . . .	291
185. Bombay Presidency . .	291
186. Madras Presidency . .	292
187. Assam . . . . .	292
188. Burma . . . . .	292
189. The Countess of Dufferin's Fund	292

SECTION VIII—*contd.*INDIAN RESEARCH FUND ASSOCIATION—*contd.*

PAGE.

PARA.

121. Malaria :—*contd.*

(e) Anopheline survey of Assam . . . . .	248
(f) Malaria in Calcutta and . . . . .	248
(g) Malaria in Assam . . . . .	248
122. Plague—(a) Bombay, (b) Rangoon, (c) Madras . . . . .	248
123. Cholera and bacteriophage.—(a) Patna, (b) Shillong, (c) Calcutta . . . . .	250
124. Kala-azar.—(a) Calcutta, (b) Kasauli . . . . .	250
125. Leprosy . . . . .	251
126. Nutrition . . . . .	251
127. Tuberculosis.—(a) Bombay, (b) Calcutta . . . . .	252
128. Anti-rabic vaccine enquiry, Kasauli . . . . .	252
129. Helminthology.—(a) Kasauli, (b) Calcutta . . . . .	252
130. Maternal mortality.—(a) Bombay, (b) Assam tea gardens, (c) Madras and (d) Punjab . . . . .	253
131. Indian simuliidae, culicoides and other blood sucking midges . . . . .	254
132. Trypanosomidae enquiry . . . . .	254
133. Indigenous drugs . . . . .	254
134. Drug addiction . . . . .	255
135. Skin diseases . . . . .	255
136. Blood changes in tropical diseases . . . . .	255
137. Secretion and composition of gastric juice in Indians . . . . .	255
138. Anthropometric measurements in Bombay . . . . .	256
139. Bio-chemical and spectroscopic enquiry in medical research . . . . .	256
140. Flora and fauna of the water supplies of the Madras Presidency . . . . .	256
141. Statistical enquiry . . . . .	256
142. Special grants . . . . .	256

## SECTION IX.

## MEDICAL INSTITUTIONS.

## I.—HOSPITALS AND DISPENSARIES.

A.—*British India.*

143. General and statistical . . . . .	257
144. North-West Frontier Province . . . . .	263
145. Punjab . . . . .	264
146. Delhi . . . . .	265
147. United Provinces . . . . .	266
148. Bihar and Orissa . . . . .	267
149. Bengal (excluding Calcutta) . . . . .	268
150. Calcutta . . . . .	269
151. Central Provinces . . . . .	270
152. Bombay Presidency . . . . .	271
153. Madras Presidency . . . . .	272
154. Coorg . . . . .	275



## SECTION VII.

## PUBLIC HEALTH WORKS.

*A.—British India.*

Para.	PAGE.
93. General . . . . .	205
94. North-West Frontier Province . . . . .	208
95. Punjab . . . . .	208
96. Delhi Province . . . . .	209
97. United Provinces . . . . .	209
98. Bihar and Orissa . . . . .	212
99. Bengal Presidency . . . . .	212
100. Central Provinces . . . . .	212
101. Bombay Presidency . . . . .	213
102. Madras Presidency . . . . .	214
103. Assam . . . . .	214
104. Burma . . . . .	215

*B.—Indian States.*

105. Mysore State . . . . .	216
106. Federated Shan States (Burma) . . . . .	216

## SECTION VIII.

## LABORATORIES AND MEDICAL RESEARCH.

107. Central Research Institute, Kasauli . . . . .	217
108. All-India Institute of Hygiene and Public Health, Calcutta . . . . .	220
109. School of Tropical Medicine, Calcutta . . . . .	226
110. Haffkine Institute, Bombay . . . . .	231
111. King Institute of Preventive Medicine, Madras . . . . .	233
112. Pasteur Institute of India, Kasauli . . . . .	234
113. Pasteur Institute of Southern India, Coonoor . . . . .	237
114. King Edward VII Memorial Pasteur Institute, Shillong and the Assam Medical Research Society . . . . .	238
115. Burma Pasteur Institute and Bacteriological Laboratory . . . . .	240
116. Pasteur Institute, Calcutta . . . . .	242
117. Pasteur Institute, Bombay . . . . .	242
118. Pasteur Institute, Patna . . . . .	243
119. Medico-legal work . . . . .	244

## INDIAN RESEARCH FUND ASSOCIATION.

120. General . . . . .	245
121. Malaria :—	
(a) Malaria Survey of India, Kasauli . . . . .	245
(b) Sind malaria enquiry . . . . .	246
(c) Malaria treatment centre, Kasauli . . . . .	247
(d) Malaria transmission enquiry, Calcutta . . . . .	247

SECTION V—*contd.*HEALTH INTELLIGENCE AND MAJOR PORTS—*contd.*

PARA.	PAGE.
60. Singapore Bureau, League of Nations . . . . .	165
61. Health Section of the League, Geneva . . . . .	168
62. The Indian delegation to the 13th (ordinary) session of the Assembly of the League of Nations . . . . .	170
63. League of Nations Regional Health Conference at Cape Town . . . . .	173
64. Kamaran Quarantine Station, Red Sea . . . . .	182
65. Mortality in seaport towns . . . . .	183
66. Rats killed in ports and on board ships, deratisation of ships and deratisation certificates . . . . .	183
67. Port of Bombay . . . . .	184
68. Port of Karachi . . . . .	187
69. Port of Calcutta . . . . .	188
70. Port of Madras . . . . .	189
71. Port of Rangoon . . . . .	189
72. Port of Aden . . . . .	190

## SECTION VI.

## VACCINATION AGAINST SMALLPOX.

*A.—British India.*

73. General . . . . .	192
74. Vaccine institutes and the supply of vaccine . . . . .	193
75. North-West Frontier Province . . . . .	195
76. Punjab . . . . .	195
77. Delhi Province . . . . .	196
78. United Provinces . . . . .	197
79. Bihar and Orissa . . . . .	198
80. Bengal Presidency . . . . .	198
81. Central Provinces . . . . .	199
82. Bombay Presidency . . . . .	199
83. Madras Presidency . . . . .	200
84. Coorg . . . . .	201
85. Assam . . . . .	201
86. Burma . . . . .	201
87. Ajmer-Merwara . . . . .	202
88. Baluchistan . . . . .	202
89. Andamans . . . . .	202
90. Vaccination among troops . . . . .	202
91. Compulsory vaccination . . . . .	203

*B.—Indian States.*

92. B. & O., Punjab, Bombay Presidency, Burma and Mysore State . . . . .	203
--	-----

SECTION II—*contd.*GENERAL HISTORY OF CHIEF DISEASES—*contd.*

PARA.	PAGE.
27. Ankylostomiasis . . . . .	94
28. Leprosy . . . . .	95
29. Rabies and hydrophobia . . . . .	98
30. Venereal diseases . . . . .	99
31. Kala-azar . . . . .	104
32. Relapsing fever . . . . .	106
33. Influenza . . . . .	107
34. Filariasis . . . . .	108
35. Yaws . . . . .	108
36. Goitre . . . . .	108
37. Guinea-worm . . . . .	109
38. Diphtheria . . . . .	109
39. Typhus . . . . .	109
40. Cancer . . . . .	109
41. Cerebro-spinal fever . . . . .	110
42. Chief diseases in Mysore State . . . . .	110

## SECTION III.

## MATERNITY AND CHILD WELFARE.

43. Maternity work and midwives' training . . . . .	111
44. Maternal mortality . . . . .	112
45. Child welfare work . . . . .	113
46. Provincial activities . . . . .	115
47. Municipal activities . . . . .	121
48. Health schools . . . . .	130
49. Indian States—Mysore State . . . . .	132

## SECTION IV.

## PUBLIC HEALTH ADMINISTRATION.

50. Administration . . . . .	133
51. Inspection of schools and colleges . . . . .	140
52. Fairs and festivals . . . . .	145
53. Health propaganda . . . . .	148
54. Industrial hygiene, including mines . . . . .	151
55. Adulteration of food . . . . .	155
56. Railways . . . . .	157

## SECTION V.

## HEALTH INTELLIGENCE AND MAJOR PORTS.

57. Indian epidemiological intelligence . . . . .	162
58. General . . . . .	162
59. Office International d'Hygiene Publique, Paris . . . . .	162

# ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1932.

## VOLUME I.

### TABLE OF CONTENTS.

#### SECTION I.

##### ON THE STATE OF PUBLIC HEALTH IN BRITISH INDIA.

PARA.	PAGE.
1. Introduction . . . . .	1
2. Population . . . . .	5
3. Rainfall and other weather conditions . . . . .	6
4. Agricultural and economic conditions . . . . .	8
5. Famine conditions and their relief . . . . .	12
6. Births . . . . .	13
7. Deaths . . . . .	18
8. Infantile mortality . . . . .	20
9. Causes of infantile mortality . . . . .	25
10. Still-births . . . . .	25
11. Registration . . . . .	26
12. Indian States ; Mysore State . . . . .	27

#### SECTION II.

##### GENERAL HISTORY OF CHIEF DISEASES

13. Chief causes of mortality . . . . .	28
14. Cholera.—(a) General, (b) provincial, (c) anti-cholera measures . . . . .	32
15. Plague.—(a) General, (b) provincial, (c) anti-plague measures . . . . .	43
16. Smallpox.—(a) General, (b) provincial, (c) isolation hospitals . . . . .	54
17. Fevers . . . . .	63
18. Malaria . . . . .	65
19. Antimalarial measures . . . . .	67
20. Quinine . . . . .	69
21. Dysentery and diarrhoea . . . . .	77
22. Enteric fever . . . . .	79
23. Respiratory diseases . . . . .	81
24. Pneumonia . . . . .	84
25. Tuberculosis.—(a) General ; (b) provincial . . . . .	85
26. Beri-beri . . . . .	93

# List of Agents from whom Government of India Publications are available.

## ENGLAND.

THE HIGH COMMISSIONER FOR INDIA, INDIA HOUSE, ALDWYCH, LONDON, W. C. 2.

## PALESTINE.

Steinmatsky, Jerusalem.

## INDIA.

### (a) PROVINCIAL GOVERNMENT BOOK DEPOSITS.

**MADRAS** :—Superintendent, Government Press, Mount Road, Madras.

**BOMBAY** :—Superintendent, Government Printing and Stationery, Queen's Road, Bombay.

**SIND** :—Library attached to the Office of the Commissioner in Sind, Karachi.

**UNITED PROVINCES OF AGRA AND OUDH** :—Superintendent of Government Press, United Provinces of Agra and Oudh, Allahabad.

**PUNJAB** :—Superintendent, Government Printing, Punjab, Lahore.

**BURMA** :—Superintendent, Government Printing, Burma, Rangoon.

**CENTRAL PROVINCES AND BERRAR** :—Superintendent, Government Printing, Central Provinces, Nagpur.

**ASSAM** :—Superintendent, Assam Secretariat Press, Shillong.

**BIHAR AND ORISSA** :—Superintendent, Government Printing, Bihar and Orissa, P. O. Gulzarbagh, Patna.

**NORTH-WEST FRONTIER PROVINCE** :—Manager, Government Printing and Stationery, Peshawar.

### (b) PRIVATE BOOK-SELLERS.

Aero Stores, Karachi City.\*

Albert Library, Dacca.

Association Press, Calcutta.

Banerjee & Bros., Ranchi, Messrs. G.

Banthia & Co., Ltd., Kuchel Road, Ajmer.

Bengal Flying Club, Dum Dum Cantt.\*

Bhawani & Sons, New Delhi.

Bombay Book Depot, Girgaon, Bombay.

Book Company, Calcutta.

Booklover's Resort, Talikad, Trivandrum, South India.

Burma Book Club, Ltd., Rangoon.

Butterworth & Co. (India), Ltd., Calcutta.

Calcutta Book Agency, 16-1, Shama Charan Day Street, Calcutta.

Chatterjee & Co., 3, Bacharam Chatterjee Lane, Calcutta.

Chakraverty, Chatterjee & Co., Ltd., 13, College Square, Calcutta.

City Book Co., Madras.

City Book House, Weston Road, Cawnpore.

Commercial Book Co., Lahore.

Das Gupta & Co., 54/3, College Street, Calcutta.

Deccan Book Store, Poona 4.

Delhi and U. P. Flying Club, Ltd., Delhi.\*

English Book Depot, Ferozepore.

English Book Depot, Tal Road, Agra, and Saddar Bazar, Jhand.

English Bookstore, Karachi.

Feroz Book Agency, New Delhi and Simla.

Gaya Prasad & Sons, Agra.

Gopalakrishna Kone, Pudumandapam, Madras, Messrs. S. M.

Grantha Mandir, Cuttack.

Higginsbothams, Madras.

Hindi Library, 137/F, Baram De Street, Calcutta.

Hyderabad Book Depot, Chaderghat, Hyderabad (Deccan).

Imperial Book Depot, 63, Chandni Chowk Street, Delhi.

Indian Army Book Depot, Dayalbagh, Agra.

Indian Army Book Depot, Jullundur City and Daryaganj, Delhi.

Indian Book Shop, Benares City.

Indian School Supply Depot, 909, Bow Bazar St., Calcutta.

Insurance Book Depot, Dayalbagh, Agra.

International Book Service, Poona 4.

Jain & Bros., Delhi, Messrs. J. M.

James Murray & Co., 12, Govt. Place, Calcutta (for Meteorological publications only).

Kali Charan & Co., Municipal Market, Calcutta.

Kanada Book Depot, 15, College Square, Calcutta.

Kanada Book Store, Bankipore, Patna.

Karnataka Publishing House, Bangalore City.

Kesie & Co., Karachi.

Kohari, Rajpura Road, Baroda, Messrs. M. C.

Krishnaswami & Co., Teppakulam P. O., Trichinopoly

Fort, Messrs. S.

Lahiri & Co., Calcutta, Messrs. S. K.

Lane Publishing Co., Mysapore, Madras.

Lawrence and Sons, Ltd., Bombay (for Meteorological publications only).

Local Self Govt. Institute, Bombay.

Mahabara & Co., Quetta, Messrs. U. P.

Mohammed Dossahel Shah, Rajkot.

Mandisore & Sons, Chowk, Baram City.

Nateson & Bros., Teppakulam P. O., Trichinopoly, S. India, Messrs. L. S.

Nateson & Co., Publishers, George Town, Madras, Messrs. G. A.

Newman & Co., Ltd., Calcutta, Messrs. W.

North India Christian Tract and Book Society, 18, Clive Road, Allahabad.

Oriental Book Supplying Agency, 15, Shukrawar, Poona City.

Oxford Book and Stationery Company, Delhi, Lahore, Simla, Meerut and Calcutta.

Pandia & Co., Bombay, Messrs. J. M.

Parikh & Co., Baroda, Messrs. B.

Pioneer Book Supply Co., 20, Shib Narayan Das Lane, Calcutta.

Popular Book Depot, Grant Road, Bombay.

Punjab Religious Book Society, Lahore.

Punjab Sanskrit Book Depot, Saldimitha Street, Lahore.

Raghunath Prasad & Sons, Patna City.

Rani Chandra Govind & Sons, Kaladevi Road, Bombay.

Ram Chandra & Sons, Simla, Kasauli.

Ram Krishna Bros., Opposite Bishram, Poona City.

Ram Narain Lal, Katra, Allahabad.

Rama Krishna & Sons, Booksellers, Anarkali, Lahore.

Ray & Sons, 48, K. & L. Edwards Road, Rawalpindi, Murree and Peshawar, Messrs. J.

Ray Chowdhury & Co., 68-5, Ashutosh Mukherjee Road, Calcutta.

Rochouse & Sons, Madras.

Rose & Co., Karachi.

Roy Chowdhury & Co., 11, College Square, Calcutta, Messrs. N. M.

and Sons, 15, College Square, Calcutta, Messrs.

Sarkar & Co., 2, Shama Charan De Street, Calcutta, Messrs. P. C.

Scientific Publishing Co., 9, Talola Lane, Calcutta.

Shri Shankar Karnataka Pustaka Bhandara, Malamuddi, Dharwar.

S. P. Bookstore, 21, Budhawar, Poona.

Srivilliputtur Co-operative Trading Union, Ltd., Srivilliputtur (S. I. R.).

Standard Book Depot, Lahore, Dalhousie and Delhi.

Standard Bookstore, Karachi.

Standard Bookstore, Quetta and Lahore.

Standard Law Book Society, 5, Hastings Street, Calcutta.

Standard Literature Company, Ltd., Calcutta.

Students' Emporium, Patna.

Students' Popular Depot, University Road, Lahore.

Surat and District Trading Society, Surat.

Taraporevala Sons & Co., Bombay, Messrs. D. B.

Thacker & Co., Ltd., Bombay.

Thacker, Spink & Co., Ltd., Calcutta and Simla.

Trilal & Co., Booksellers, Princess Street, Kalbadevi Road, Bombay, Messrs. N. M.

University Book Agency, Karachi Road, Lahore.

Upper India Publishing House, Ltd., Literature Palace, Ammuadavla Park, Lucknow.

Varadachary & Co., Madras, Messrs. P.

Vijapur & Co., Visapattanam.

Wheeler & Co., Allahabad, Calcutta and Bombay, Messrs. A. H.

Agents for publications on Aviation only.

**ANNUAL REPORT**  
**OF THE**  
**PUBLIC HEALTH COMMISSIONER**  
**WITH THE GOVERNMENT OF INDIA**  
**FOR 1932**



**Volume I**  
**With Appendices**

**ANNUAL REPORT**  
**OF THE**  
**PUBLIC HEALTH COMMISSIONER**  
**WITH THE GOVERNMENT OF INDIA**  
**FOR 1932**



**Volume I**  
**With Appendices**